

AI708 Series Intelligent Temperature Controller User Manual



Features:

- ⊙ TC / RTD / Analog signal universal input, selected by software menu.
- ⊙ With display, alarm and adjusting function
- ⊙ Advanced Fuzzy algorithm & Two Degrees of Freedom PID Arithmetic.
- ⊙ Optional control output, modularization design.
- ⊙ Good anti-jamming.
- ⊙ Switching power supply 100-240VAC.
- ⊙ Applied to system temperature control application.

For your safe, please read the below content carefully before you use the temperature controller!

■ Safe Caution

- | | |
|---|---|
| ※ | Please read the manual carefully before you use the temperature controller. |
| ※ | Please comply with the below important points. |
| ⚠ | Warning An accident may happen if the operation does not comply with the instruction. |
| ⚠ | Notice An operation that does not comply with the instruction may lead to product damage. |
| ※ | The instruction of the symbol in the manual is as below. |
| ⚠ | An accident danger may happen in a special condition. |

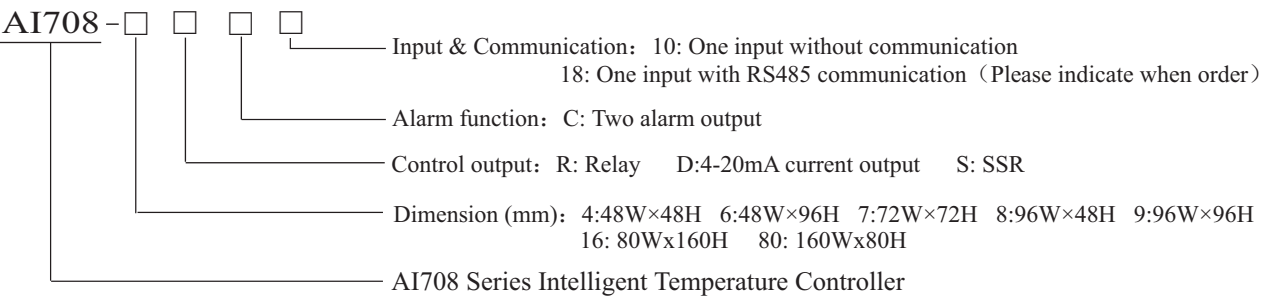
⚠ Warning

1. A safety protection equipment must be installed or please contact with us for the relative information if the product is used under the circumstance such as nuclear control, medical treatment equipment, automobile, train, airplane, aviation and equipment etc. Otherwise, it may cause serious loss, fire or person injury.
2. A panel must be installed, otherwise it may cause creepage (leakage).
3. Do not touch wire connectors when the power is on, otherwise you may get an electric shock.
4. Do not dismantle or modify the product. If you have to do so, please contact with us first. Otherwise it may cause electric shock and fire.
5. Please check the connection number while you connect the power supply wire or input signal, otherwise it may cause fire.

⚠ Caution

1. This product cannot be used outdoors. Otherwise the working life of the product will become shorter, or an electric shock accident may happen.
2. When you connect wire to the power input connectors or signal input connectors, the moment of the No.20 AWG (0.50 mm²) screw tweaked to the connector is 0.74n.m - 0.9n.m. Otherwise the connectors may be damaged or get fire.
3. Please comply with the rated specification. Otherwise it may cause electric shock or fire, and damage the product.
4. Do not use water or oil base cleaner to clean the product. Otherwise it may cause electric shock or fire and damage the product.
5. This product should be avoid working under the circumstance that is flammable, explosive, moist, under sunshine, heat radiation and vibration. Otherwise it may cause explosion.
6. In this unit it must not have dust or deposit, otherwise it may cause fire or mechanical malfunction.
7. Do not use gasoline, chemical solvent to clean the cover of the product because such solvent can damage it. Please use some soft cloth with water or alcohol to clean the plastic cover.

1. Model



2. Model Indication

Model	Alarm no.	OUT1	OUT2	Dimension (mm)
AI708-4RC10	2	Relay output	Relay output	48HX48WX110L
AI708-4SC10	2	SSR output	Relay output	48HX48WX110L
AI708-4DC10	2	4-20mA current output	Relay output	48HX48WX110L
AI708-6RC10	2	Relay output	Relay output	96HX48WX110L
AI708-6SC10	2	SSR output	Relay output	96HX48WX110L
AI708-6DC10	2	4-20mA current output	Relay output	96HX48WX110L
AI708-7RC10	2	Relay output	Relay output	72HX72WX110L
AI708-7SC10	2	SSR output	Relay output	72HX72WX110L
AI708-7DC10	2	4-20mA current output	Relay output	72HX72WX110L
AI708-8RC10	2	Relay output	Relay output	48HX96WX110L
AI708-8SC10	2	SSR output	Relay output	48HX96WX110L
AI708-8DC10	2	4-20mA current output	Relay output	48HX96WX110L
AI708-9RC10	2	Relay output	Relay output	96HX96WX110L
AI708-9SC10	2	SSR output	Relay output	96HX96WX110L
AI708-9DC10	2	4-20mA current output	Relay output	96HX96WX110L

Note: OUT1: 4-20mA current output, load resistance 600Ωmax.

Relay output capacity: 3A/230Vac

SSR output capacity: 30mA/24Vdc

OUT2: Relay output capacity: 3A/230Vac.

Alarm: Relay output capacity: 1A/230Vac

3. Main Technical Parameters

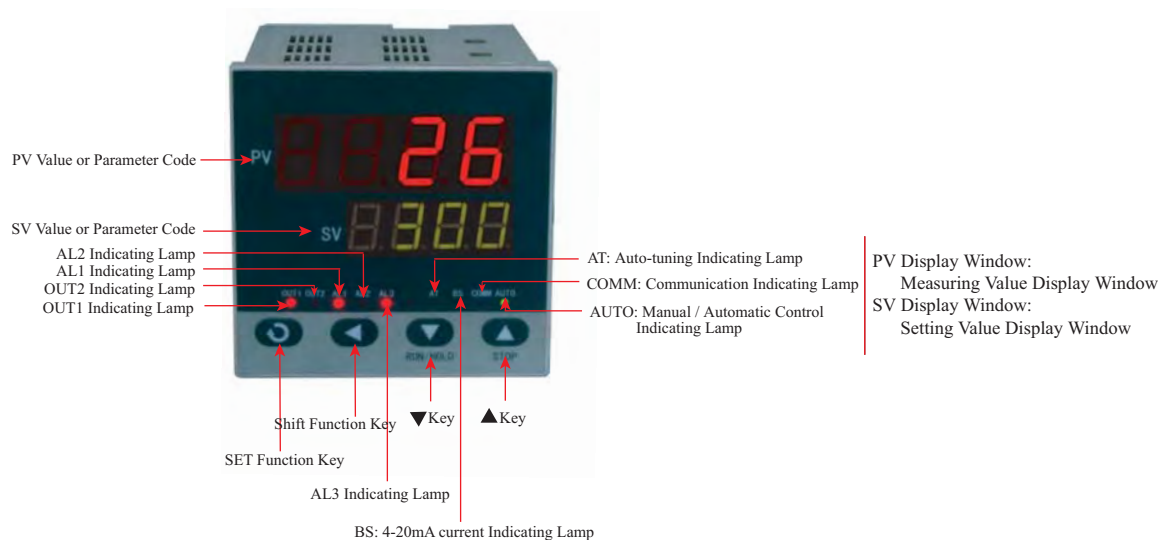
Whole controller parameters

Power supply	100-240VAC
Total current	<30mA (220VAC)
Ambient temperature	0-50℃
Ambient humidity	45-85%RH
Measurement accuracy	0.3%FS±3digits 25℃
Control mode	ON/OFF control, PID heating control, PID cooling control, PID heating & cooling control
Communication function	RS485 communication interface, MODBUS protocol
Panel protection level	IP65
Temperature excursion	≤0.01%FS/℃
Dielectric strength	Between the connectors of power supply to relay output, power supply to signal input, relay output to signal input ≥2000VDC; Between the low voltage signal isolated with each other ≥ 600VDC.

4. Input signal table

No.	Input signal	Measuring range	Resolution	Input impedance
K	K type thermocouple	-50~1300℃	1℃	>100KΩ
J	J type thermocouple	-50~1200℃	1℃	>100KΩ
E	E type thermocouple	-50~1000℃	1℃	>100KΩ
T	T type thermocouple	-50~400℃	1℃	>100KΩ
B	B type thermocouple	600~1800℃	1℃	>100KΩ
R	R type thermocouple	-10~1700℃	1℃	>100KΩ
S	S type thermocouple	-10~1600℃	1℃	>100KΩ
N	N type thermocouple	-50~1200℃	1℃	>100KΩ
	Reserved			
Pt	PT100	-199.9~850.0℃	0.1℃	(0.2mA)
JPt	JPT100	-199.9~500.0℃	0.1℃	(0.2mA)
CU50	CU50	-50.0~150.0℃	0.1℃	(0.2mA)
CU100	CU100	-50.0~150.0℃	0.1℃	(0.2mA)
V	Linear voltage	0~50mV	0.01%FS	>100KΩ
I	Linear current	4~20mA	0.01%FS	<110Ω
V	Linear voltage	0~10V	0.01%FS	>100KΩ
R	Linear resistance	0~400Ω	0.01%FS	(0.2mA)

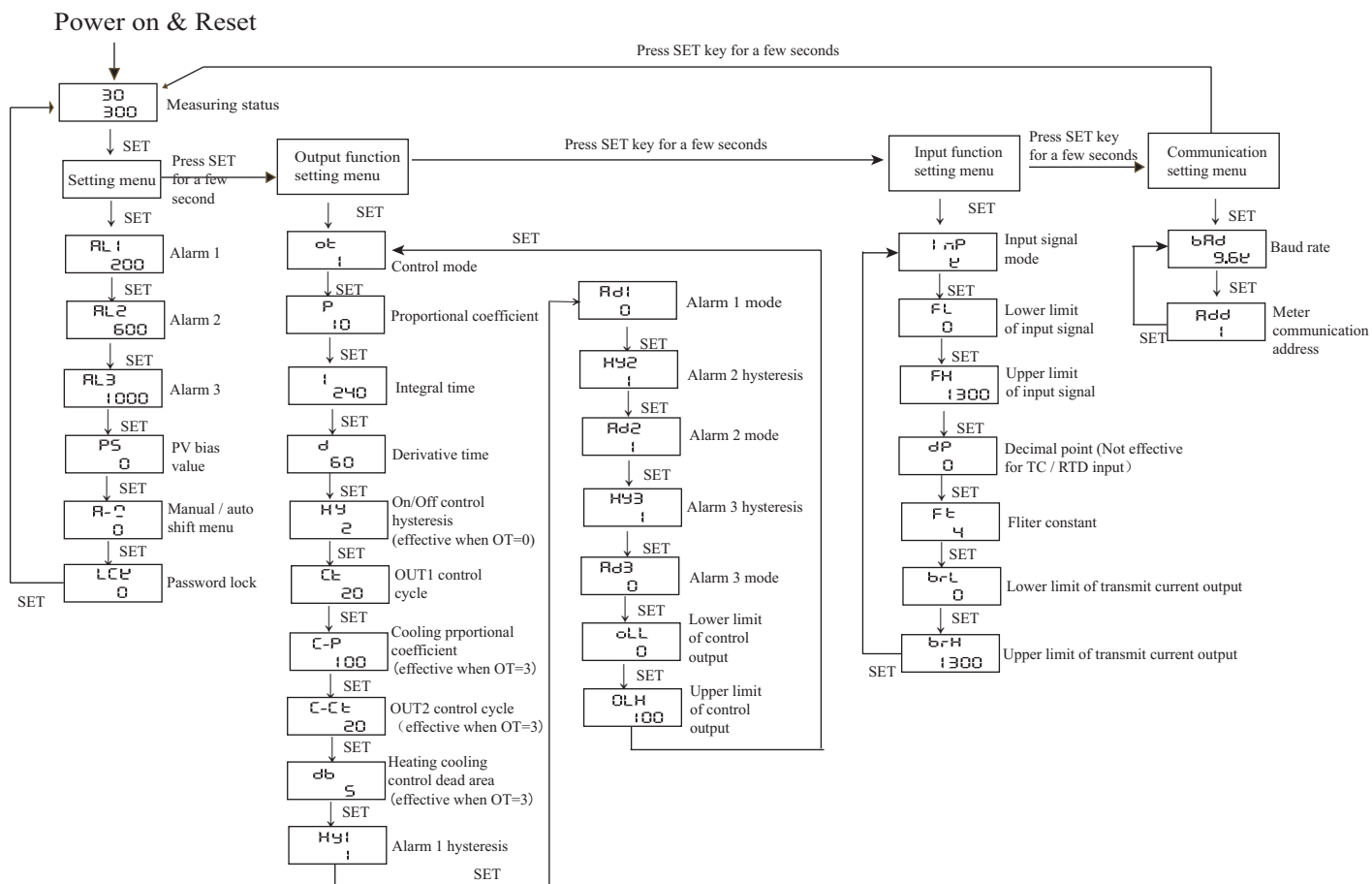
5. Panel indication



6. Panel Key Operation

- (1) SET key: In normal display status, press SET key to show setting menu, press SET key for a few seconds to show advanced setting menu.
- (2) ◀ key: press ◀ key to make the parameters to flicker, the parameters can be changed.
- (3) ▲, ▼ key: to change parameters in setting status.
- (4) In advanced setting menu, press SET key for a few seconds to quit the menu and back to normal display status.
- (5) In normal display status, press ◀ key for 3 second to start Auto-tuning function, at this moment AT indicating lamp turns on.

7. Operation Sequence

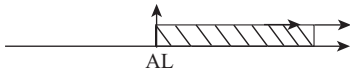
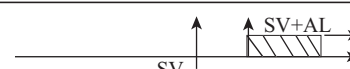


8. Menu

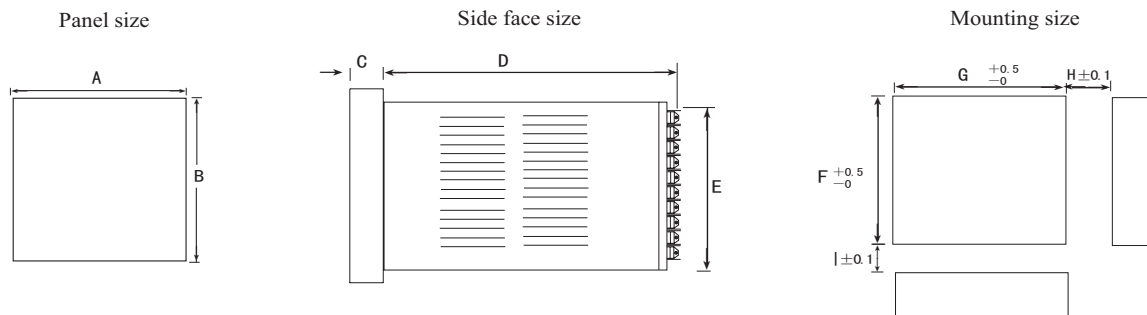
Parameter name	Indication	Setting range	Ex-factory setting
Setting menu			
AL1	Alarm 1 setting value	FL~FH	200
AL2	Alarm 2 setting value	FL~FH	600
AL3	Alarm 3 setting value	FL~FH	100
PS	Measured value amendment	-100~100	0
A_M	Manual / auto setting: 0: Manual; 1: half-auto (Start Auto-tuning manually) 2: auto (Start Auto-tuning automatically after power on)	0~2	1
LCK	If the units digit (4th digit from left to right) is 1, SV is prohibited to be changed; if the tens digit (3rd digit) is 1, menu parameters are prohibited to be changed.	0~9999	0
Output function setting menu			
OT	Control mode. 0: ON/OFF control; 1: Heating control; 2: Cooling control; 3: Heating & cooling control	0~3	1
P	Proportional coefficient	0~9999	10
I	Integral time	0~3600	240
D	Derivative time	0~3600	60
HY	ON/OFF control hysteresis	0~1000	2
CT	OUT1 control cycle	0~250	20
C_P	Cooling proportional coefficient	1~200	100
C_CT	OUT2 control cycle	1~250	20
DB	Dead area for heating & cooling control	-100~100	5
HY1	Alarm hysteresis 1	0~1000	1
AD1	Alarm mode 1	0~3	0
HY2	Alarm hysteresis 2	0~1000	1
AD2	Alarm mode 2	0~3	1
HY3	Alarm hysteresis 3	0~1000	1
AD3	Alarm mode 3	0~3	0

OLL	Lower limit of control output	0~99	0
OLH	Upper limit of control output	1~100	100
Input function setting menu			
INP	Input signal type	Please refer to input signal table	K
FL	Lower display limit of input signal	Please refer to input signal table	0
FH	Upper display limit of input signal	Please refer to input signal table	1300
DP	Decimal point setting. Only effective for analog signal input	0~3	0
FT	Filter constant	1~250	4
BRL	Display for 4mA transmit current output	FL~FH	0
BRH	Display for 20mA transmit current output	FL~FH	1300
Communication setting menu			
BAD	Baud rate	4.8K, 9.6K, 19.2K	9.6K
ADD	Meter communication address	0~250	1

Alarm function table

Alarm code	Alarm mode	Alarm output (AL1, AL2 is independent with each other)
0	Inverse (Low limit)	
1	Direct (High limit)	
2	Low relative to SV	
3	High relative to SV	

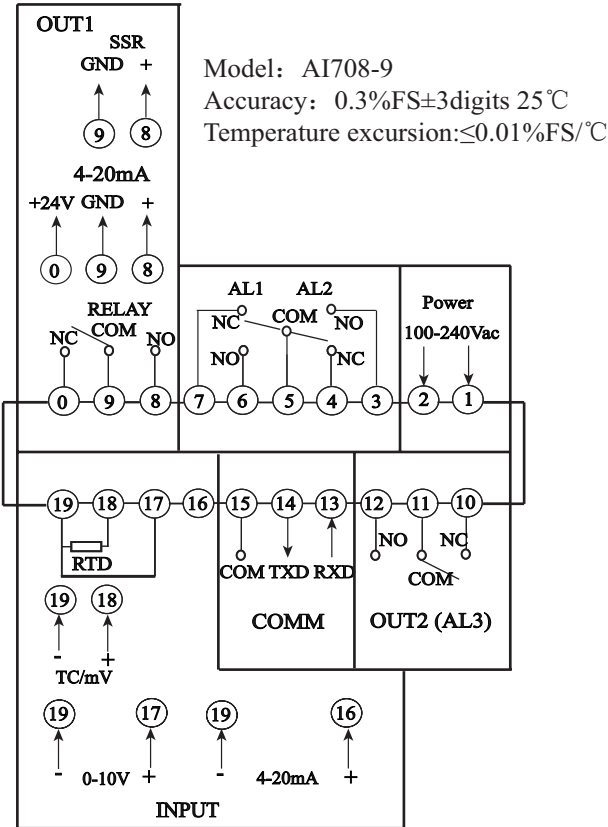
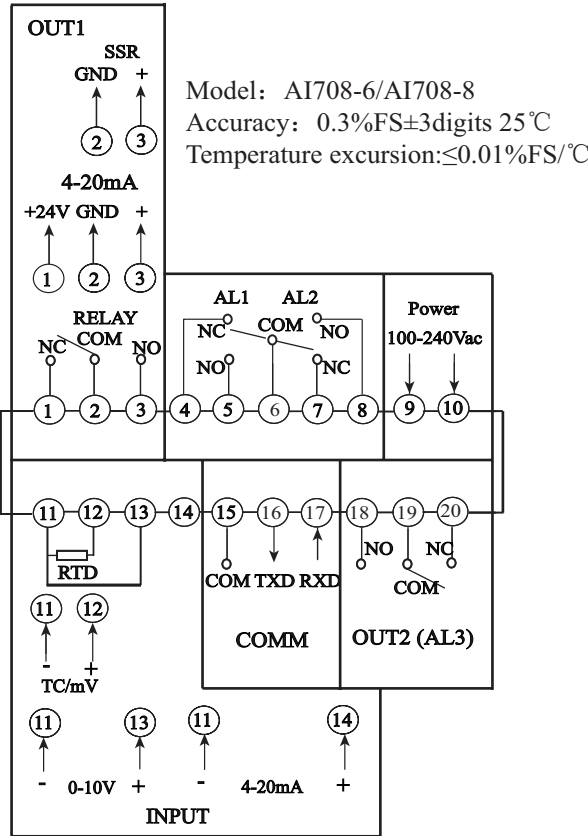
9. Appearance & Mounting Dimension



Model	A	B	C	D	E	F	G	H	I
AI708-4	48	48	6	100	45	46	46	30	30
AI708-6	48	96	9	100	89.5	91	46	30	30
AI708-7	72	72	9	100	67	68	68	30	30
AI708-8	96	48	9	100	45	46	91	30	30
AI708-9	96	96	9	100	89.5	91	91	30	30

Unit: mm

10. Connection Drawing



11. Simple Problem Shooting

Display Message	Shooting Method
Display HHHH	Input disconnect or over upper limit, please check input signal, FH value and ambient working temperature.
Display LLLL	Input disconnect or under lower limit, please check input signal, FL value and ambient working temperature.

AI808 Series Intelligent Temperature Controller User Manual



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- ⊙ With display, alarm and adjusting function
- ⊙ Advanced Fuzzy algorithm & Two Degrees of Freedom PID Arithmetic.
- ⊙ Optional control output, modularization design.
- ⊙ Good anti-jamming.
- ⊙ Up to 50 program stages control.

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5. Please check the connection number while you connect the power supply wire or input signal, otherwise it may cause fire.

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1. This product cannot be used outdoors. Otherwise the working life of the product will become shorter, or an electric shock accident may happen.
2. When you connect wire to the power input connectors or signal input connectors, the moment of the No.20 AWG (0.50 mm²) screw tweaked to the connector is 0.74n.m - 0.9n.m. Otherwise the connectors may be damaged or get fire.
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1. Model

AI808P - □ □ □ □

- Signal input: 10: One signal input without communication
18: One signal input with RS485 communication (please indicate when order)
- Alarm function: C: 2 alarm output (OUT2 relay output is 3rd alarm output when the heating & cooling control is not used)
- Output function: R: Relay S: Logic (SSR) D: Current (4-20mA)
- Dimension: 4: 48Wx48H 6: 48Wx96H 7: 72Wx72H 8: 96Wx48H 9: 96Wx96H
16: 80Wx160H 80: 160Wx80H 12: 120Wx120H
- AI808 series intelligent temperature controller (with 50 program stages control)

2. Model Indication

Model	Alarm no.	OUT1	OUT2	Communication
AI808P-□RC10	2	Relay output	Relay output	No
AI808P-□SC10	2	SSR output	Relay output	No
AI808P-□DC10	2	4-20mA current output	Relay output	No
AI808P-□RC18	2	Relay output	Relay output	RS485 (Modbus RTU)
AI808P-□SC18	2	SSR output	Relay output	RS485 (Modbus RTU)
AI808P-□DC18	2	4-20mA current output	Relay output	RS485 (Modbus RTU)

3. Main Technical Parameters

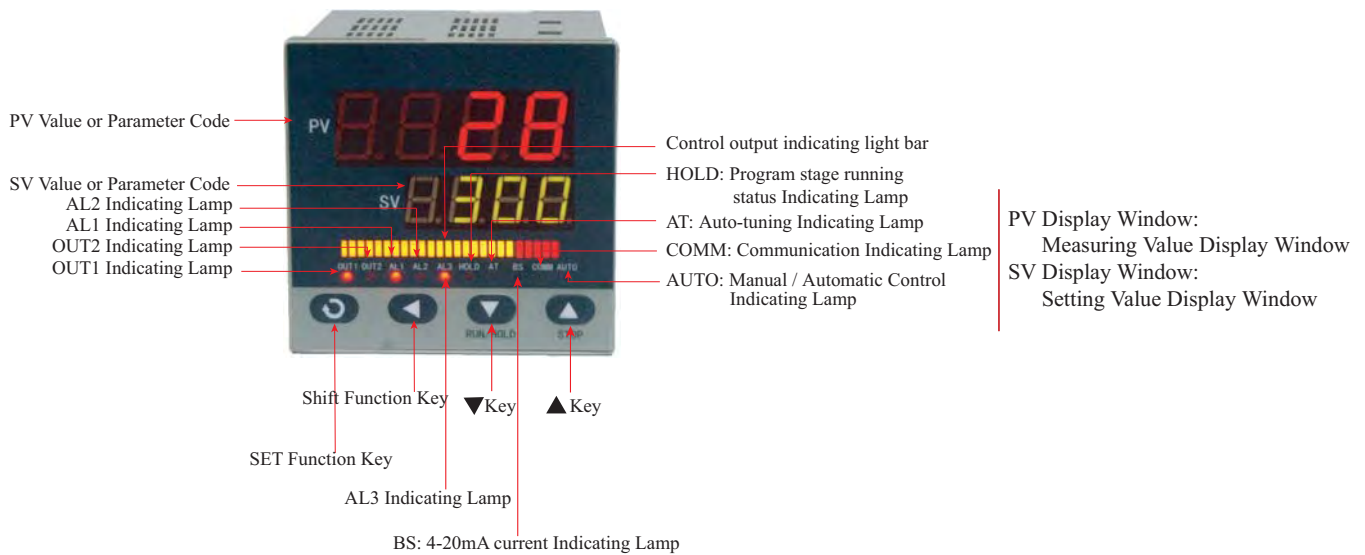
1) Whole controller parameters

Power supply	100-240VAC
Total current	<30mA (220VAC)
Ambient temperature	0-50℃
Ambient humidity	45-85%RH
Measurement accuracy	0.3%FS±3digits 25℃
Control mode	ON/OFF control, PID heating control, PID cooling control, PID heating & cooling control
Communication function	RS485 communication interface, MODBUS protocol
Panel protection level	IP65
Temperature excursion	≤0.01%FS/℃
Dielectric strength	Between the connectors of power supply to relay output, power supply to signal input, relay output to signal input ≥2000VDC; Between the low voltage signal isolated with each other ≥ 600VDC.
OUT1	4-20mA current output, load resistance 600Ω max.
	Relay output capacity: 3A/230Vac
	SSR output capacity: 30mA/24Vdc
OUT2	Relay output capacity: 3A/230Vac.
Alarm	Relay output capacity: 1A/230Vac

2) Input signal table

Signal	Input type	Measuring range	Resolution	Input impedance
	K type thermocouple	-50~1300℃	1℃	>100KΩ
	J type thermocouple	-50~1200℃	1℃	>100KΩ
	E type thermocouple	-50~1000℃	1℃	>100KΩ
	T type thermocouple	-50~400℃	1℃	>100KΩ
	B type thermocouple	600~1800℃	1℃	>100KΩ
	R type thermocouple	-10~1700℃	1℃	>100KΩ
	S type thermocouple	-10~1600℃	1℃	>100KΩ
	N type thermocouple	-50~1200℃	1℃	>100KΩ
	Reserved			
	PT100	-199.9~850.0℃	0.1℃	(0.2mA)
	JPT100	-199.9~500.0℃	0.1℃	(0.2mA)
	CU50	-50.0~150.0℃	0.1℃	(0.2mA)
	CU100	-50.0~150.0℃	0.1℃	(0.2mA)
	Linear voltage	0~50mV	0.01%FS	>100KΩ
	Linear current	4~20mA	0.01%FS	<110Ω
	Linear voltage	0~10V	0.01%FS	>100KΩ
	Linear resistance	0~400Ω	0.01%FS	(0.2mA)

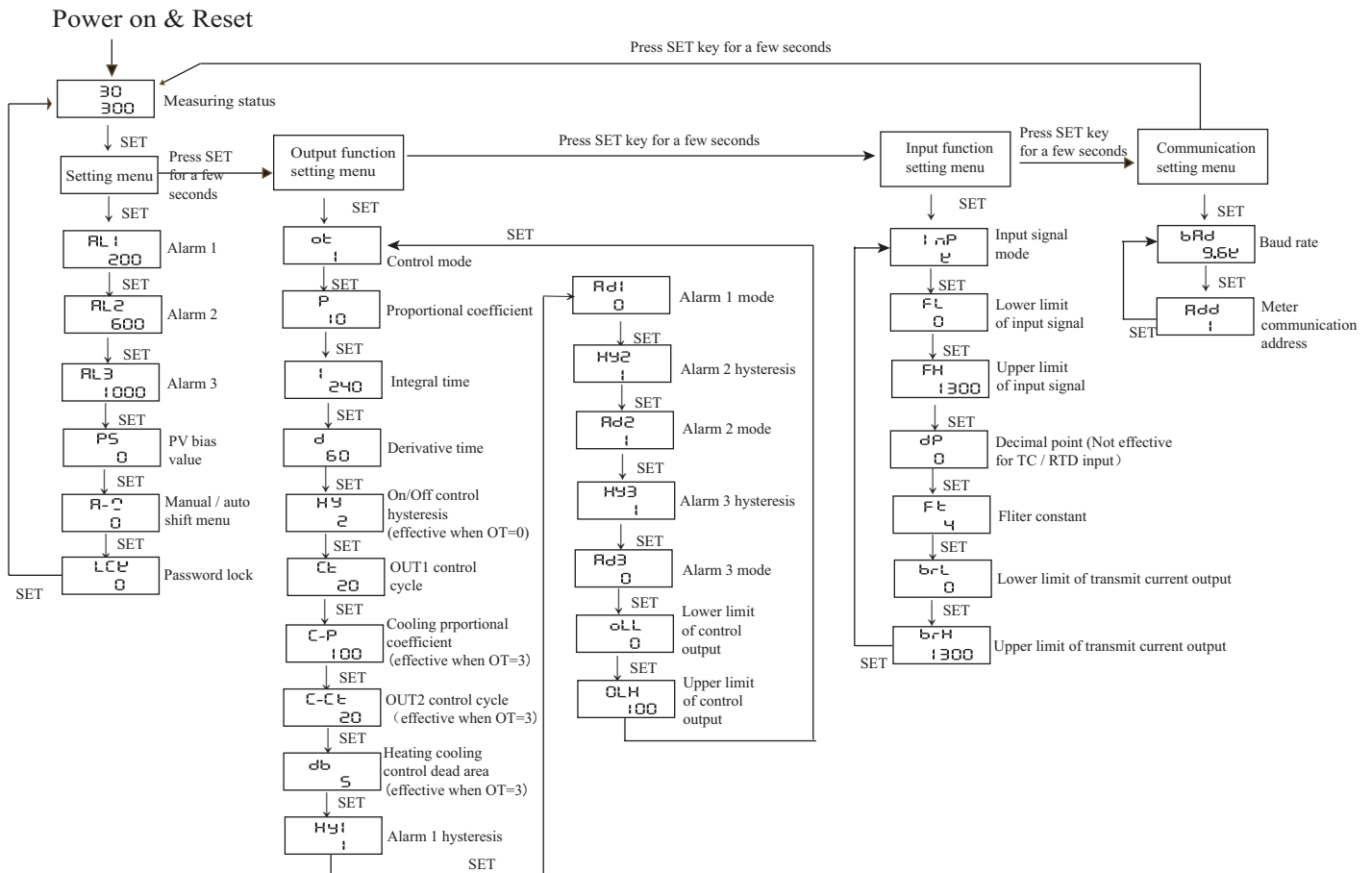
4. Panel indication



5. Panel Key Operation

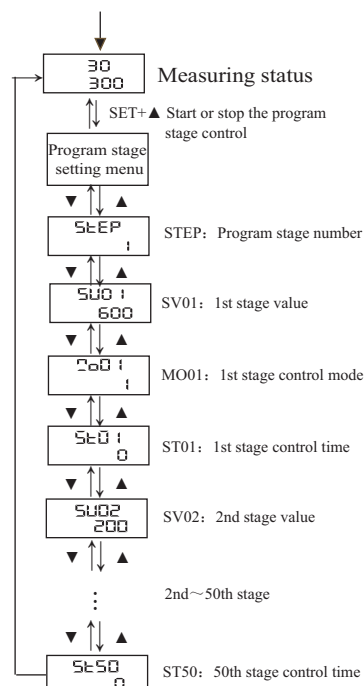
- (1) SET key: In normal display status, press SET key to show setting menu, press SET key for a few seconds to show advanced setting menu.
- (2) ◀ key: press ◀ key to make the parameters to flicker, the parameters can be changed.
- (3) ▲, ▼ key: to change parameters in setting status.
- (4) In advanced setting menu, press SET key for a few seconds to quit the menu and back to normal display status.
- (5) In normal display status, press ◀ key for 3 second to start Auto-tuning function, at this moment AT indicating lamp turns on.

6. Operation Sequence



7. Program stage control setting

Power on & Reset



Program stage control setting method:

- 1) There are total 50 program stages. For each stage, there are 3 settable parameters: SV, MO, ST.
- 2) SV value is the object control value of a stage, for example, if SV is 200, the object control value of this stage is 200℃.
- 3) MO value is the control mode of a stage.
MO value is -50~-1, it means the current stage will jump to the appointed stage, for example, if it is -45, it means the current stage will jump to stage no.45 directly, after the control of this stage is finished.
MO value is 0, it means the program stage control function will be stopped automatically when the program turns to this stage.
MO value is 1, it means when a stage control is running, the condition for jumping to next stage is setting time, when time is up, this stage will jump to the next appointed stage automatically.
MO value is 2, it means when a stage control is running, the condition for jumping to next stage is setting temperature, when the current temperature changes to the setting value, this stage will jump to the next appointed stage automatically.
- 4) ST value is running time of a stage, the unit is minute. When MO is set to 1, the stage will run until ST is changed to 0. For example, SV=200, MO=1, ST=10, the current temperature is 30℃, this stage will run for 10 minutes. So the temperature will raise 17℃ per minute in average. If MO=2, there is no time limit for temperature raise in this stage, when temperature reaches 200℃, the stage will jump to next one automatically.
- 5) In normal display status, press SET key and ▲ key at the same time to show the parameter setting menu of program stage control.
- 6) In normal display status, press SET key and ▼ key at the same time to run / stop program stage control function. HOLD lamp is on when program stage control is running. HOLD lamp is off when this control stops running.

Example: Here is a control process with below requirement, the relevant setting is on the right side:

- 1) Temperature raises to 300℃, SV01=300, MO01=2; (No time limit)
- 2) Temperature is keep at 300℃ for 20 minute, SV02=300, MO02=1, ST02=20;
- 3) Temperature falls to 150℃, SV03=150, MO03=2;
- 4) Temperature is keep at 150℃ for 60 minute, and then SV04=150, MO04=1, ST04=60;
- 5) Program jumps to No.10 stage MO05= -10;
- 6) Temperature falls to 25℃ at No.10 stage SV10=25, MO10=2;
- 7) Program control stops running at No.11 stage. MO11=0;

8. Menu

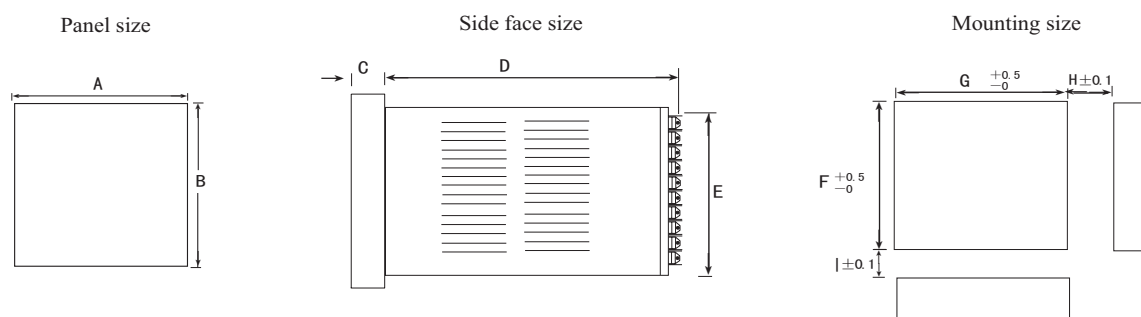
Parameter name	Indication	Setting range	Ex-factory setting
Setting menu			
AL1	Alarm 1 setting value	FL~FH	200
AL2	Alarm 2 setting value	FL~FH	600
AL3	Alarm 3 setting value	FL~FH	100
PS	Measured value amendment	-100~100	0
A_M	Manual / auto setting: 0: Manual; 1: half-auto (Start Auto-tuning manually) 2: auto (Start Auto-tuning automatically after power on)	0~2	1
LCK	If the units digit (4th digit from left to right) is 1, SV is prohibited to be changed; if the tens digit (3rd digit) is 1, menu parameters are prohibited to be changed.	0~9999	0
Output function setting menu			
OT	Control mode. 0: ON/OFF control; 1: Heating control; 2: Cooling control; 3: Heating & cooling control	0~3	1
P	Proportional coefficient (P=0: ON / OFF control)	0~9999	10
I	Integral time	0~3600	240
D	Derivative time	0~3600	60
HY	ON/OFF control hysteresis	0~1000	2
CT	OUT1 control cycle	0~250	20
C_P	Cooling proportional coefficient	1~200	100
C_CT	OUT2 control cycle	1~250	20
DB	Dead area for heating & cooling control	-100~100	5
HY1	Alarm hysteresis 1	0~1000	1
AD1	Alarm mode 1	0~3	0
HY2	Alarm hysteresis 2	0~1000	1
AD2	Alarm mode 2	0~3	1
HY3	Alarm hysteresis 3	0~1000	1
AD3	Alarm mode 3	0~3	0

OLL	Lower limit of control output	0~99	0
OLH	Upper limit of control output	1~100	100
Input function setting menu			
INP	Input signal type	Please refer to input signal table	K
FL	Lower display limit of input signal	Please refer to input signal table	0
FH	Upper display limit of input signal	Please refer to input signal table	1300
DP	Decimal point setting. Only effective for analog signal input	0~3	0
FT	Filter constant	1~250	4
BRL	Display for 4mA transmit current output	FL~FH	0
BRH	Display for 20mA transmit current output	FL~FH	1300
Communication setting menu			
BAD	Baud rate	4.8K, 9.6K, 19.2K	9.6K
ADD	Meter communication address	0~250	1

Alarm function table

Alarm code	Alarm mode	Alarm output (AL1, AL2 is independent with each other)
0	Direct (High limit)	
1	Inverse (Low limit)	
2	High relative to SV	
3	Low relative to SV	

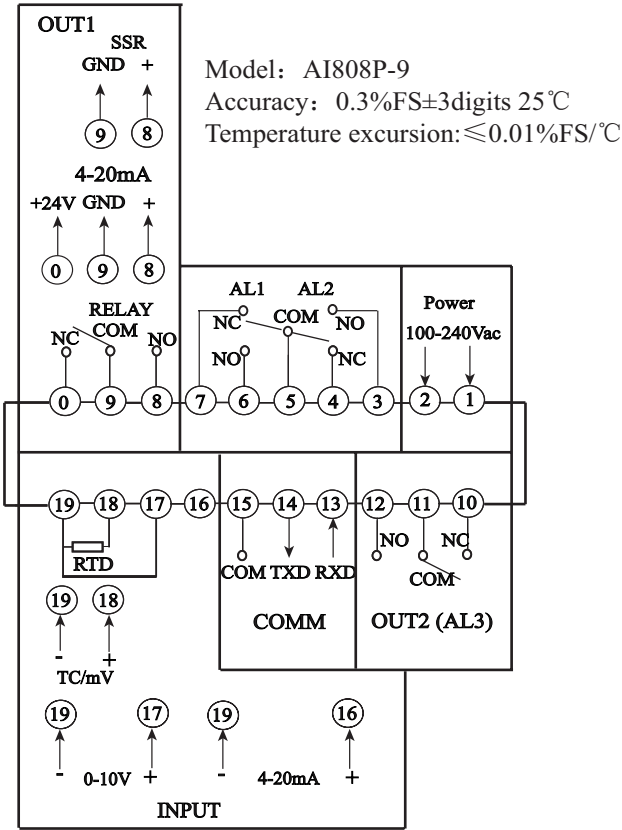
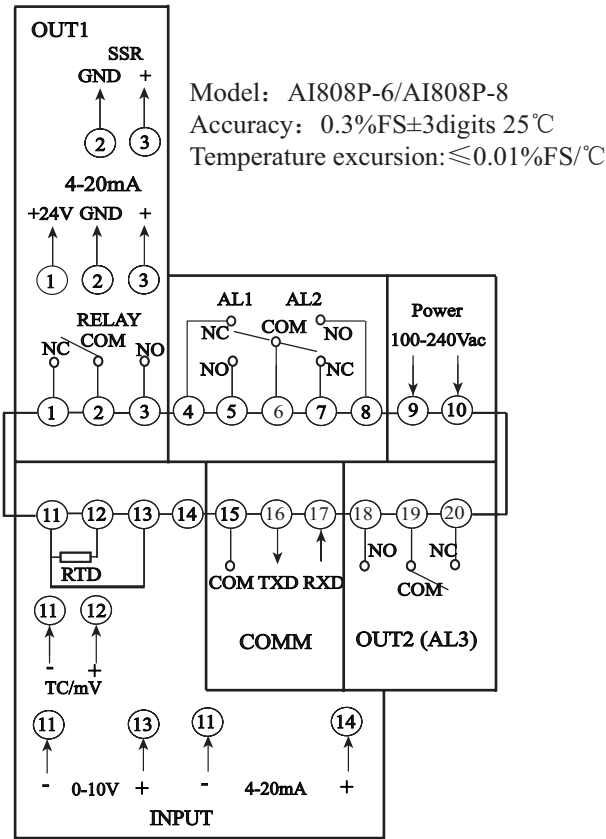
9. Apperance & Mounting Dimension



Model	A	B	C	D	E	F	G	H	I
AI808P-4	48	48	6	100	45	46	46	30	30
AI808P-6	48	96	9	100	89.5	91	46	30	30
AI808P-7	72	72	9	100	67	68	68	30	30
AI808P-8	96	48	9	100	45	46	91	30	30
AI808P-9	96	96	9	100	89.5	91	91	30	30

Unit: mm

10. Connection Drawing



11. Simple Problem Shooting

Display Message	Shooting Method
Display HHHH	Input disconnect or over upper limit, please check input signal, FH value and ambient working temperature.
Display LLLL	Input disconnect or under lower limit, please check input signal, FL value and ambient working temperature.

AI508 Series Temperature Controller Manual



Features:

- ⊙ TC / RTD / Analog signal universal input, selected by software menu.
- ⊙ With display, alarm and adjusting function
- ⊙ Advanced Two Degrees of Freedom PID Arithmetic.
- ⊙ Auto-tuning function suitable to different system (Quick heating / cooling and Slow heating system)
- ⊙ Optional control output, modularization design.
- ⊙ Good anti-interference.
- ⊙ Switching power supply 100-240VAC.
- ⊙ Applied to system temperature control application.

For your safe, please read the below content carefully before you use the temperature controller!

■ Safe Caution

※	Please read the manual carefully before you use the temperature controller.
※	Please comply with the below important points.
⚠	Warning An accident may happen if the operation does not comply with the instruction.
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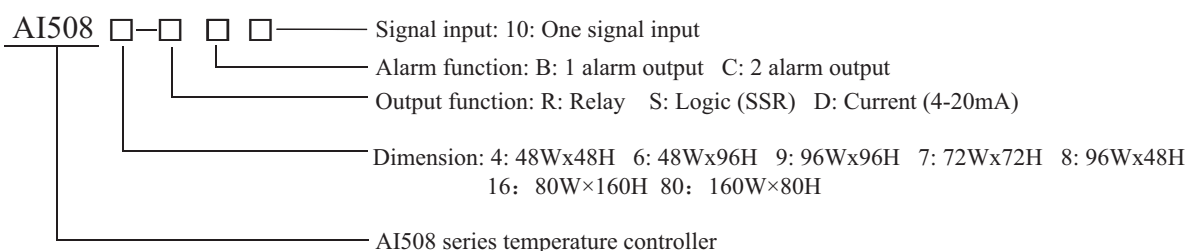
⚠ Warning

1. A safety protection equipment must be installed or please contact with us for the relative information if the product is used under the circumstance such as nuclear control, medical treatment equipment, automobile, train, airplane, aviation and equipment etc.. Otherwise, it may cause serious loss, fire or person injury.
2. A panel must be installed, otherwise it may cause creepage (leakage).
3. Do not touch wire connectors when the power is on, otherwise you may get an electric shock.
4. Do not dismantle or modify the product. If you have to do so, please contact with us first. Otherwise it may cause electric shock and fire.
5. Please check the connection number while you connect the power supply wire or input signal, otherwise it may cause fire.

⚠ Caution

1. This product cannot be used outdoors. Otherwise the working life of the product will become shorter, or an electric shock accident may happen.
2. When you connect wire to the power input connectors or signal input connectors, the moment of the No.20 AWG (0.50 mm²) screw tweaked to the connector is 0.74n.m - 0.9n.m. Otherwise the connectors may be damaged or get fire.
3. Please comply with the rated specification. Otherwise it may cause electric shock or fire, and damage the product.
4. Do not use water or oil base cleaner to clean the product. Otherwise it may cause electric shock or fire and damage the product.
5. This product should be avoid working under the circumstance that is flammable, explosive, moist, under sunshine, heat radiation and vibration. Otherwise it may cause explosion.
6. In this unit it must not have dust or deposit, otherwise it may cause fire or mechanical malfunction.
7. Do not use gasoline, chemical solvent to clean the cover of the product because such solvent can damage it. Please use some soft cloth with water or alcohol to clean the plastic cover.

1. Model



2. Model Indication

Model	Alarm No.	Control Output	Dimension(mm)
AI508-4-RB10	1	Relay	48Hx48WX105L
AI508-4-SB10	1	Logic (SSR)	48Hx48WX105L
AI508-4-DB10	1	Current	48Hx48WX105L
AI508-6-RC10	2	Relay	96Hx48WX112L
AI508-6-SC10	2	Logic (SSR)	96Hx48WX112L
AI508-6-DC10	2	Current	96Hx48WX112L
AI508-9-RC10	2	Relay	96Hx96WX118L
AI508-9-SC10	2	Logic (SSR)	96Hx96WX118L
AI508-9-DC10	2	Current	96Hx96WX118L
AI508-7-RC10	2	Relay	72Hx72WX112L
AI508-7-SC10	2	Logic (SSR)	72Hx72WX112L
AI508-7-DC10	2	Current	72Hx72WX112L
AI508-8-RC10	2	Relay	48Hx96WX112L
AI508-8-SC10	2	Logic (SSR)	48Hx96WX112L
AI508-8-DC10	2	Current	48Hx96WX112L
AI508-80-RC10	2	Relay	80Hx160WX112L
AI508-80-SC10	2	Logic (SSR)	80Hx160WX112L
AI508-80-DC10	2	Current	80Hx160WX112L
AI508-16-RC10	2	Relay	160Hx80WX112L
AI508-16-SC10	2	Logic (SSR)	160Hx80WX112L
AI508-16-DC10	2	Current	160Hx80WX112L

3. Technical Parameters

1) Meter Parameters

Power Supply	100-240V AC/DC
Total Current	<30mA (220VAC)
Ambient Temperature	0-50℃
Ambient Humidity	45-85RH%

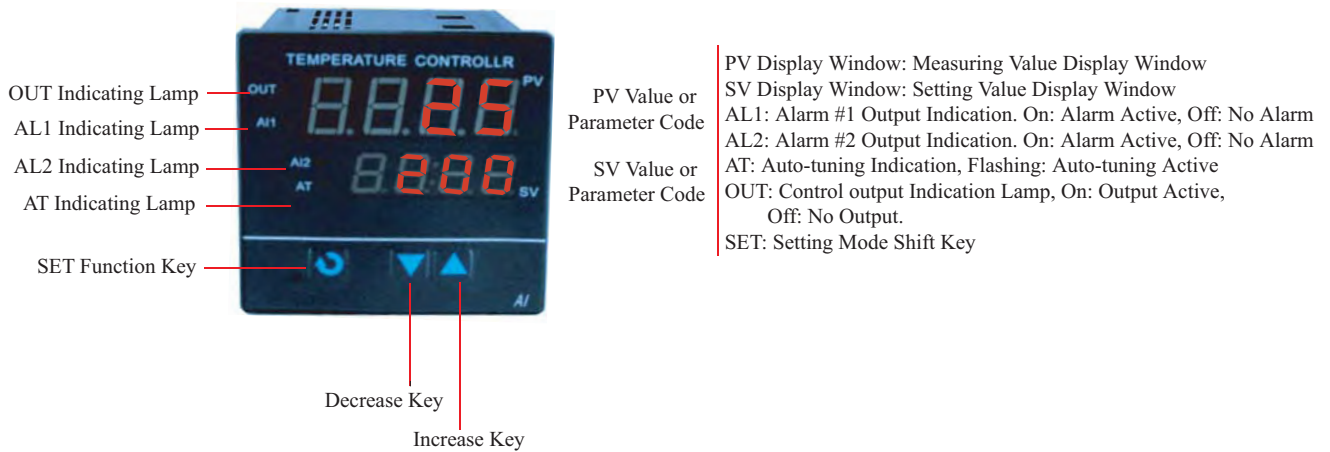
2) Input Signal

Code	Input type	Measuring range	Resolution	Accuracy	Input Impedance
0	S type TC	0-1600℃	1℃	0.5%FS±3digits	>100KΩ
1	B type TC	200-1800℃	1℃	0.5%FS±3digits	>100KΩ
2	K type TC	0-1300℃	1℃	0.5%FS±3digits	>100KΩ
3	E type TC	0-600℃	1℃	0.5%FS±3digits	>100KΩ
4	T type TC	0-300℃	1℃	0.5%FS±2digits	>100KΩ
5	J type TC	0-800℃	1℃	0.5%FS±3digits	>100KΩ
6	Reserved				
7	PT100 High Temperature	-200-800℃	0.1℃	0.5%FS±2digits	(0.2mA)
8	PT100 Low Temperature	-200-200℃	0.1℃	0.5%FS±1digits	(0.2mA)
9	CU50	-50-150℃	0.1℃	0.5%FS±1digits	(0.2mA)
10	0-20mV	0-20mV	10 digits AD	0.5%FS±3digits	>100KΩ
11	0-50mV	0-50mV	10 digits AD	0.5%FS±3digits	>100KΩ
12	Linear Resistance	0-400Ω	10 digits AD	1%FS±3digits	(0.2mA)

3) Output control

Output Type	Capacity
Relay	Relay output, 3A/220VAC
Current	Current output, 4-20mA, load resistance Max.600Ω
Logic	DC 24V voltage, drive load 30mA

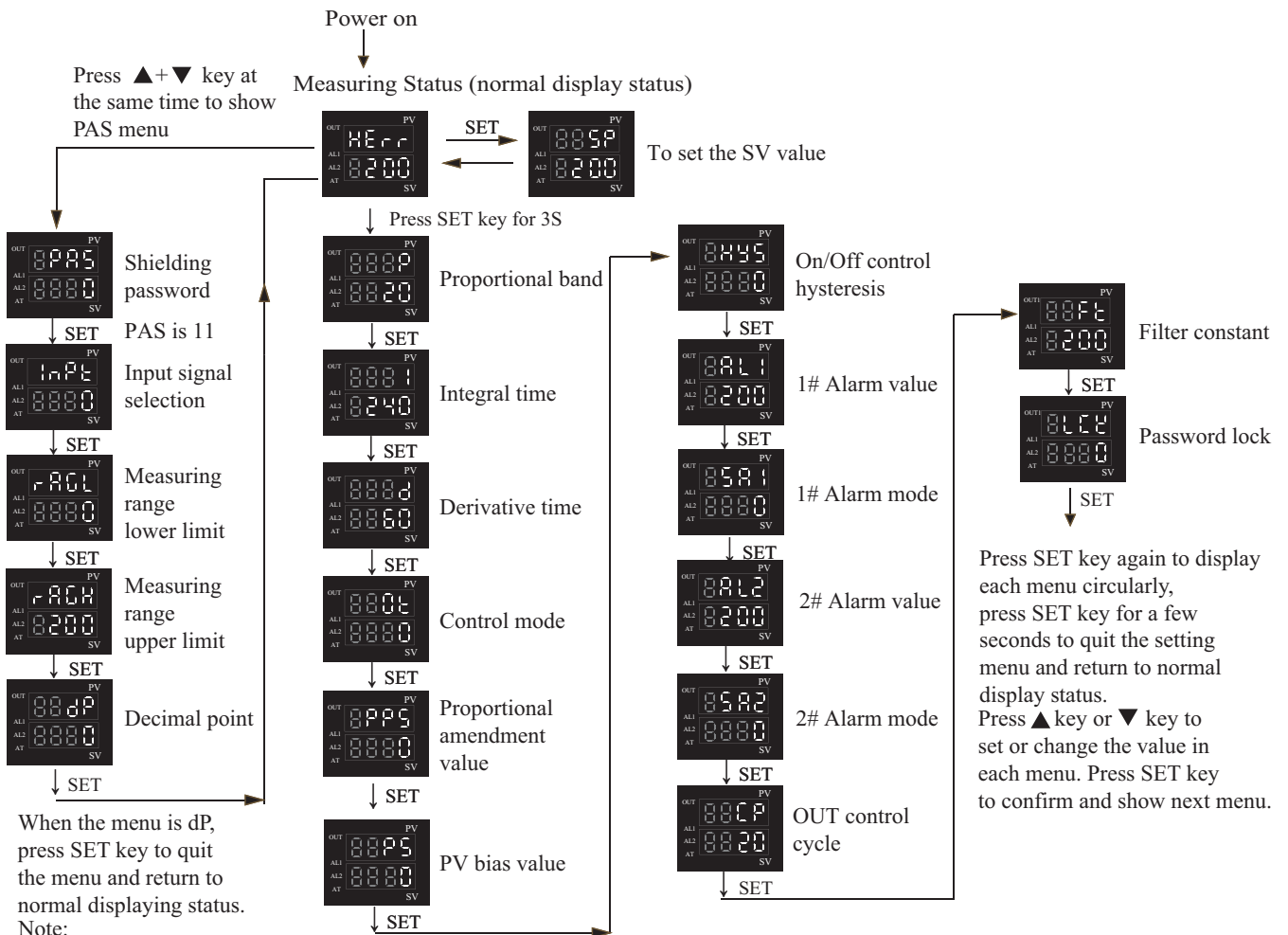
4. Panel



5. Panel Key Operation

- (1) SET Key: In normal display status, press SET Key to show SV modifying menu; press SET key for a few seconds to show setting menu.
- (2) “▲”, “▼” Key: Press ▲ or ▼ to set the value in SV value menu or setting menu.
- (3) “▲” Key: In normal display status, press it for a few seconds to start Auto-tuning applied to Quick heating / cooling system (For raising temperature quickly).
- (4) “▼” Key: In normal display status, press it for a few seconds to start Auto-tuning applied to Slow heating / cooling system (For small overshoot).

6. Operation Sequence



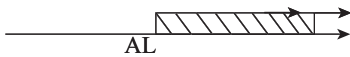
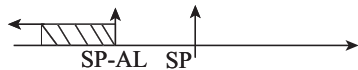
7. PID Control Menu

Parameter	Indication	Setting Range	Ex-Factory setting
P	Proportional Band. The smaller the proportional band is, the faster the system heats. Instead, the slower the system heats. Increase proportional band will decrease the oscillation, but increase control bias. Decrease proportional band will decrease control bias, but cause oscillation.	0-Upper Limit	20
I	Integral Time. The smaller the integral time is, the stronger the integral action is and better for eliminating the bias between it and the setting value. If the integral time is too short, it may not eliminate the bias.	0-3600	240
D	Derivative Time. To decrease the derivative time to a proper value can prevent the system from oscillating. The bigger the D is, the stronger the derivative action is.	0-3600	60
σt	0: On / Off control 1: Heating control 2: Cooling control	0-2	1
PPS	Proportional amendment value for amending static error.	0-10	0
PS	PV bias value for amending the bias caused by the measuring process.	-50-50	0
HYS	On / Off control hysteresis (It is effective when σt is set as 0.)	0-25	0
$RL1$	Alarm #1 (Alarm hysteresis value is fixed at 0.6)	Lower limit - Upper limit	200
$SR1$	Alarm #1 mode (Please refer to alarm parameter table)	0-12	0
$RL2$	Alarm #2 (Alarm hysteresis value is fixed at 0.6)	Lower limit - Upper limit	200
$SR2$	Alarm #2 mode (Please refer to alarm parameter table)	0-6	0
CP	OUT control cycle. For relay output, it is bigger than 4; for logic or pulse output, it is 2; for current output, it is 1.	1-120S	20
Ft	Filter constant. The smaller Ft is, the faster response is, but it may cause fluctuation.	0-255	60
LCt	0: Allowed to change all parameters; 1: Only for SV value change; 2: Any change prohibited	0-2	0

Measuring parameters setting menu

Parameter	Indication	Setting range
INPT	Input signal selection, please refer to Input parameter table	0-12
RAGL	Lower limit of measuring range	Lower limit of input signal-RAGH
RAGH	Upper limit of measuring range	RAGL-Upper limit of input signal
DP	0: No decimal point 1: 1 digit decimal point 2: 2 digit decimal point (Not effective for TC/RTD input)	0-2

Alarm parameters table

Alarm code	Alarm mode	Alarm output (AL1, AL2 has no relation with each other)
1	Absolute value upper limit	
2	Absolute value lower limit	
3	Deviation upper limit	
4	Deviation lower limit	
5	Deviation upper / lower limit	
6	Deviation upper / lower range	

Alarm parameters table

Alarm code	Alarm mode	AL1, AL2 are used together, AL1 alarm output, AD2 must be set as 0
7	Absolute value upper / lower range	
8	Deviation upper / lower range	
9	Absolute value upper / deviation lower range	
10	Deviation upper / absolute value lower range	
11	Absolute value upper / lower limit	
12	Deviation upper / lower limit	

8. Advanced Function

The setting of P.I.D parameters & Auto-tuning operation

1. To set P.I.D parameters manually:

A default PID value has been set before the controller is ex-factory. This P.I.D value is applied to normal heating, cooling system for temperature control. If the performance is not so good with the default P.I.D, the value can be changed manually for the users who have some automation control theory and experience.

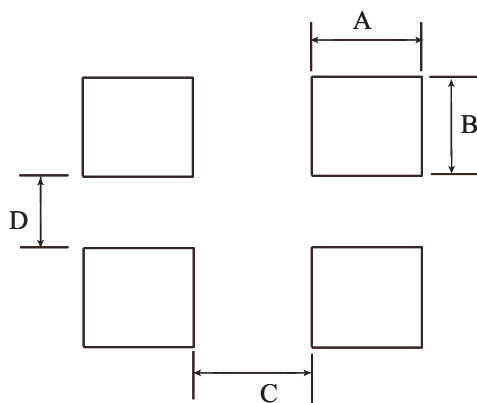
2. To set P.I.D parameters automatically:

If users do not know how to set P.I.D parameters, they can use the Auto-tuning function of the controller. Auto-tuning function is that the controller calculates the P, I, D value according to the specific heating system, and then controls temperature automatically as per the P, I, D value it gets.

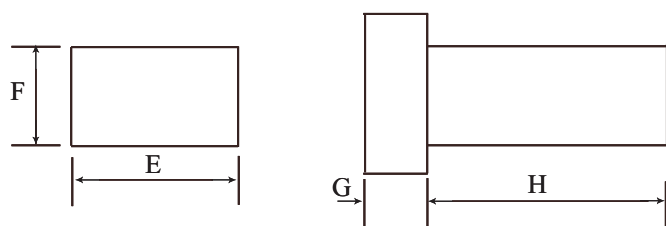
Auto-tuning method: At first set the SV value, press ▲ key or ▼ key for 3 seconds until “AT” indicating lamp turns on,. “AT” lamp on means Auto-tuning is running. At this moment please don't change the SV value or any parameters on the machines / equipments in order to make sure the Auto-tuning accuracy. After “AT” lamp turns off, the controller will refresh the P.I.D value automatically. At this moment, the controller can control temperature automatically and accurately.

9. Mounting Dimension

1. Mounting



2. Dimension

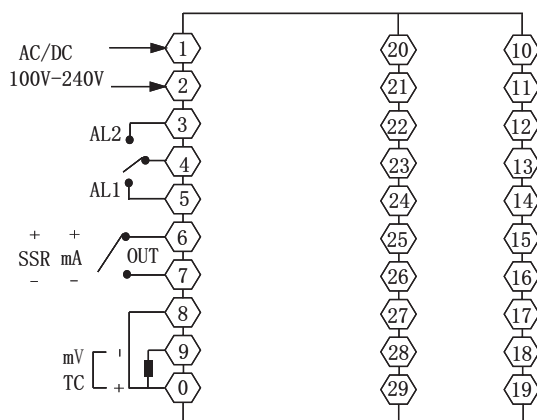


3. The dimension list of AI508 models:

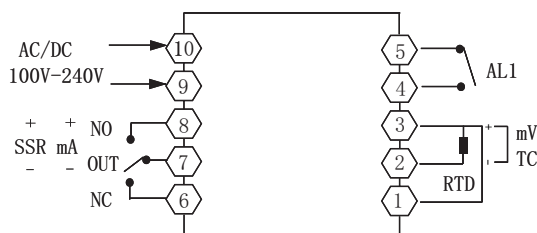
Size Model	A	B	C	D	E	F	G	H
AI508-4	44+0.5	44+0.5	30	25	48	48	5	100
AI508-6	44+0.5	91+0.5	25	30	48	96	12	100
AI508-7	67.5+0.8	67.5+0.8	30	25	72	72	12	100
AI508-9	91+0.5	91+0.5	25	25	96	96	18	100
AI508-8	91+0.5	44+0.5	25	30	96	48	12	100
AI508-80	154+0.5	76+0.5	30	25	160	80	10	92
AI508-16	76+0.5	154+0.5	25	30	80	160	10	92

10. Connection drawing

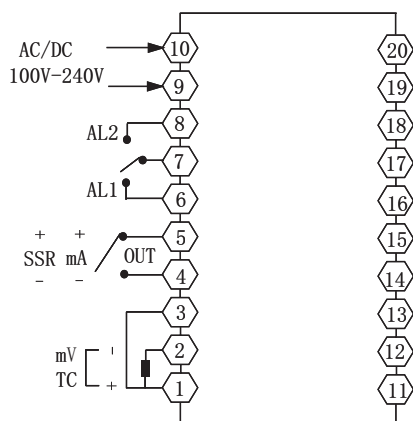
AI508-9 Power Supply: AC/DC 100V-240V
Alarm Output: AC 250V 1A
(Resistance Load)
Voltage Control Output: DC 24V 30mA
Current Control Output: 4-20mA
Relay Control Output: AC 250V 3A



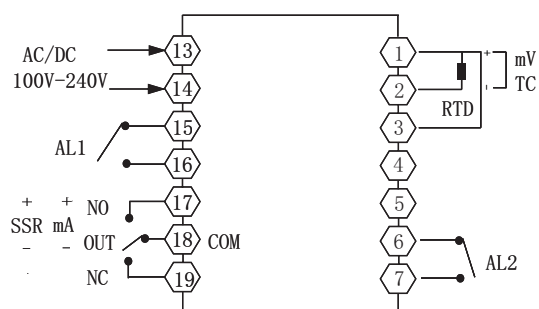
AI508-4 Power Supply: AC/DC 100V-240V
Alarm Output: AC 250V 1A
(Resistance Load)
Voltage Control Output: DC 24V 30mA
Current Control Output: 4-20mA
Relay Control Output: AC 250V 3A



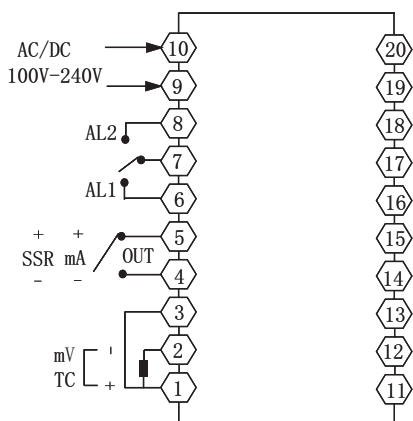
AI508-6 Power Supply: AC/DC 100V-240V
Alarm Output: AC 250V 1A
(Resistance Load)
Voltage Control Output: DC 24V 30mA
Current Control Output: 4-20mA
Relay Control Output: AC 250V 3A



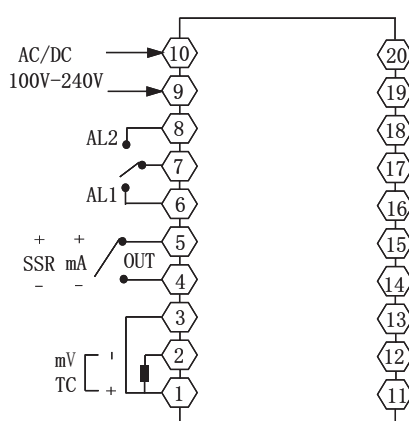
AI508-7 Power Supply: AC/DC 100V-240V
Alarm Output: AC 250V 1A
(Resistance Load)
Voltage Control Output: DC 24V 30mA
Current Control Output: 4-20mA
Relay Control Output: AC 250V 3A



AI508-80/16 Power Supply: AC/DC 100V-240V
Alarm Output: AC 250V 1A
(Resistance Load)
Voltage Control Output: DC 24V 30mA
Current Control Output: 4-20mA
Relay Control Output: AC 250V 3A



AI508-8 Power Supply: AC/DC 100V-240V
Alarm Output: AC 250V 1A
(Resistance Load)
Voltage Control Output: DC 24V 30mA
Current Control Output: 4-20mA
Relay Control Output: AC 250V 3A



11. Simple Problem Shooting

Display Message	Shooting Method
Display HERR	Input disconnect or over upper limit, please check input signal, RAGH value and ambient temperature.
Display LERR	Input disconnect or under lower limit, please check input signal, RAGL value and ambient temperature.

TR Series Temperature Controller Manual



Features:

- ⊙ Universal input: RTD, TC, Analog Signal, selected by software.
- ⊙ Function: Displaying, Alarm and Adjusting.
- ⊙ Advanced Two Degrees of Freedom PID Arithmetic
- ⊙ Auto-tuning PID function for different systems (Increasing/Decreasing temperature quickly, Heating system with low speed).
- ⊙ Optional control output, modularization design.
- ⊙ High anti-interference.
- ⊙ Switching Power Supply (SPS) is 100-240VAC.
- ⊙ Applied to system temperature control.

For your safe, please read the below content carefully before you use the temperature controller!

■ Safe Caution

※ Please read the manual carefully before you use the temperature controller!

※ Please comply with the below important points:

⚠ Warning An accident may happen if the operation does not comply with the instruction.

⚠ Notice An operation that does not comply with the instruction may lead to product damage.

※ The instruction of the symbol in the manual is as below:

⚠ An accident danger may happen in a special condition.

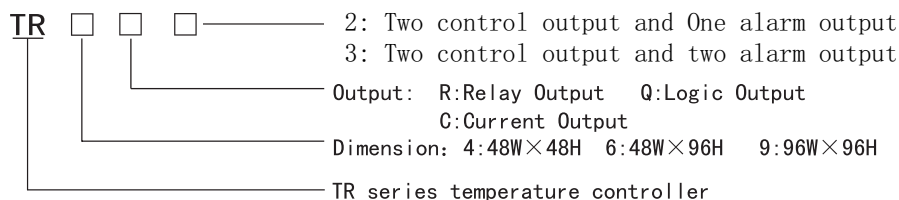
⚠ Warning

1. A safety protection equipment must be installed or please contact with us for the relative information if the product is used under the circumstance such as nuclear control, medical treatment equipment, automobile, train, airplane, aviation, entertainment or safety equipment, etc. Otherwise, it may cause serious loss, fire or person injury.
2. A panel must be installed, otherwise it may cause creepage (leakage).
3. Do not touch wire connectors when the power is on, otherwise you may get an electric shock.
4. Do not dismantle or modify the product. If you have to do so, please contact with us first. Otherwise it may cause electric shock and fire.
5. Please check the connection number while you connect the power supply wire or input signal, otherwise it may cause fire.

⚠ Caution

1. This product cannot be used outdoors. Otherwise the working life of the product will become shorter, or an electric shock accident may happen.
2. When you connect wire to the power input connectors or signal input connectors, the moment of the No. 20 AWG (0.50 mm²) screw tweaked to the connector is 0.74n.m – 0.9n.m. Otherwise the connectors may be damaged or get fire.
3. Please comply with the rated specification. Otherwise it may cause fire after the working life of the product becomes shorter.
4. Do not use water or oil base cleaner to clean the product. Otherwise it may cause electric shock or fire, and damage the product.
5. This product should be avoid working under the circumstance that is flammable, explosive, moist, under sunshine, heat radiation and vibration. Otherwise it may cause explosion.
6. In this unit it must not have dust or deposit, otherwise it may cause fire or mechanical malfunction.
7. Do not use gasoline, chemical solvent to clean the cover of the product because such solvent can damage it. Please use some soft cloth with water or alcohol to clean the plastic cover.

1) Model



2) Model Indication

Model	Alarm Number	Control Output	Alarm Output	Dimension (mm)
TR4-R2	1	Relay Output	Relay Output	48Hx48WX78L
TR4-Q2	1	Logic Output	Relay Output	48Hx48WX78L
TR4 (special order)	2	Relay or Logic Output	Relay Output	48Hx48WX78L
TR6-R3	2	Relay Output	Relay Output	96Hx48WX78L
TR6-Q3	2	Logic Output	Relay Output	96Hx48WX78L
TR6-C3	2	Current Output	Relay Output	96Hx48WX78L
TR9-R3	2	Relay Output	Relay Output	96Hx96WX78L
TR9-Q3	2	Logic Output	Relay Output	96Hx96WX78L
TR9-C3	2	Current Output	Relay Output	96Hx96WX78L

3) Primary Technical Parameters

1. Parameters for whole controller

Total Voltage	100-240VAC
Total Current	<30mA (220VAC)
Ambient Temperature	0-50℃
Ambient Humidity	45-85RH%

2. Input

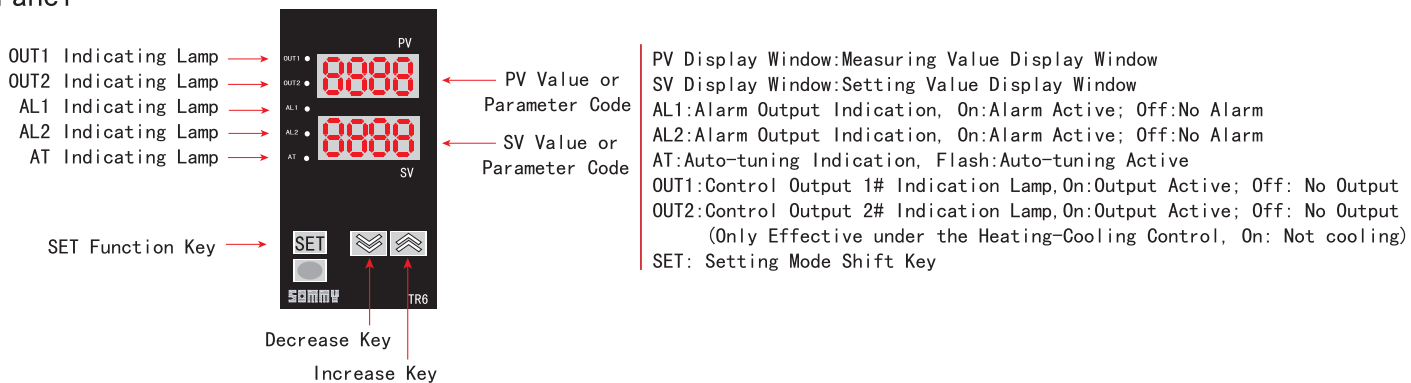
Code	Input Type	Measure Range	Resolution	Accuracy	Input Impedance
0	TC Type S	0-1600℃	1℃	0.5%FS±3digits	>100KΩ
1	TC Type B	200-1800℃	1℃	0.5%FS±3digits	>100KΩ
2	TC Type K	0-1300℃	1℃	0.5%FS±3digits	>100KΩ
3	TC Type E	0-600℃	1℃	0.5%FS±3digits	>100KΩ
4	TC Type T	0-300℃	1℃	0.5%FS±2digits	>100KΩ
5	TC Type J	0-800℃	1℃	0.5%FS±3digits	>100KΩ
6	Reservation				
7	PT100 High Temperature	-200-800℃	0.1℃	0.5%FS±2digits	(0.2mA)
8	PT100 Low Temperature	-200-200℃	0.1℃	0.5%FS±1digits	(0.2mA)
9	CU50	-50-150℃	0.1℃	0.5%FS±1digits	(0.2mA)
10	0-20mV	0-20mV	10digitsAD	0.5%FS±3digits	>100KΩ
11	0-50mV	0-50mV	10digitsAD	0.5%FS±3digits	>100KΩ
12	Linear Resistance	0-400Ω	10digitsAD	1%FS±3digits	

3. Output

Output Type		Capacity
Relay Output	OUT1	relay output, 3A/220VAC
	OUT2	relay output, 1A/220VAC
Current Output	OUT1	current output, 4mA-20mA, load resistance 600Ω
	OUT2	relay output, 1A/220VAC
Logic Output	OUT1	24V Voltage, with load 30mA
	OUT2	relay output, 1A/220VAC

※ Note: When the controller is set as heating-cooling control, OUT1 cannot be current output.

4) Panel



1 Panel Key Operation

- (1) SET Key: In normal display status, press SET Key to enter SV setting menu, press SET key for a few seconds to enter setting menu.
- (2) ▲▼ Key: Press them to set the value in the SV value menu or setting menu.
- (3) ▲Key: In normal display status, press it for a few seconds to enter Auto-tuning which is applied to quick heating & cooling system.
(For increasing temperature quickly)
- (4) ▼Key: In normal display status, press it for a few seconds to enter Auto-tuning which is applied to slow heating & cooling system.
(For small overshoot)

2 P.I.D parameters setting & Auto-tuning operation

- (1) To set P.L.D parameters manually:

The default PID value has been pre-set when the product is ex-factory. This PID value is applicable to normal heating/cooling system for temperature control. If the temperature control performance is not very good when using the default PID value, the value can be changed according to the experience for those users who have the automation control theory & experience.

- (2) To set P, I, D parameters automatically:

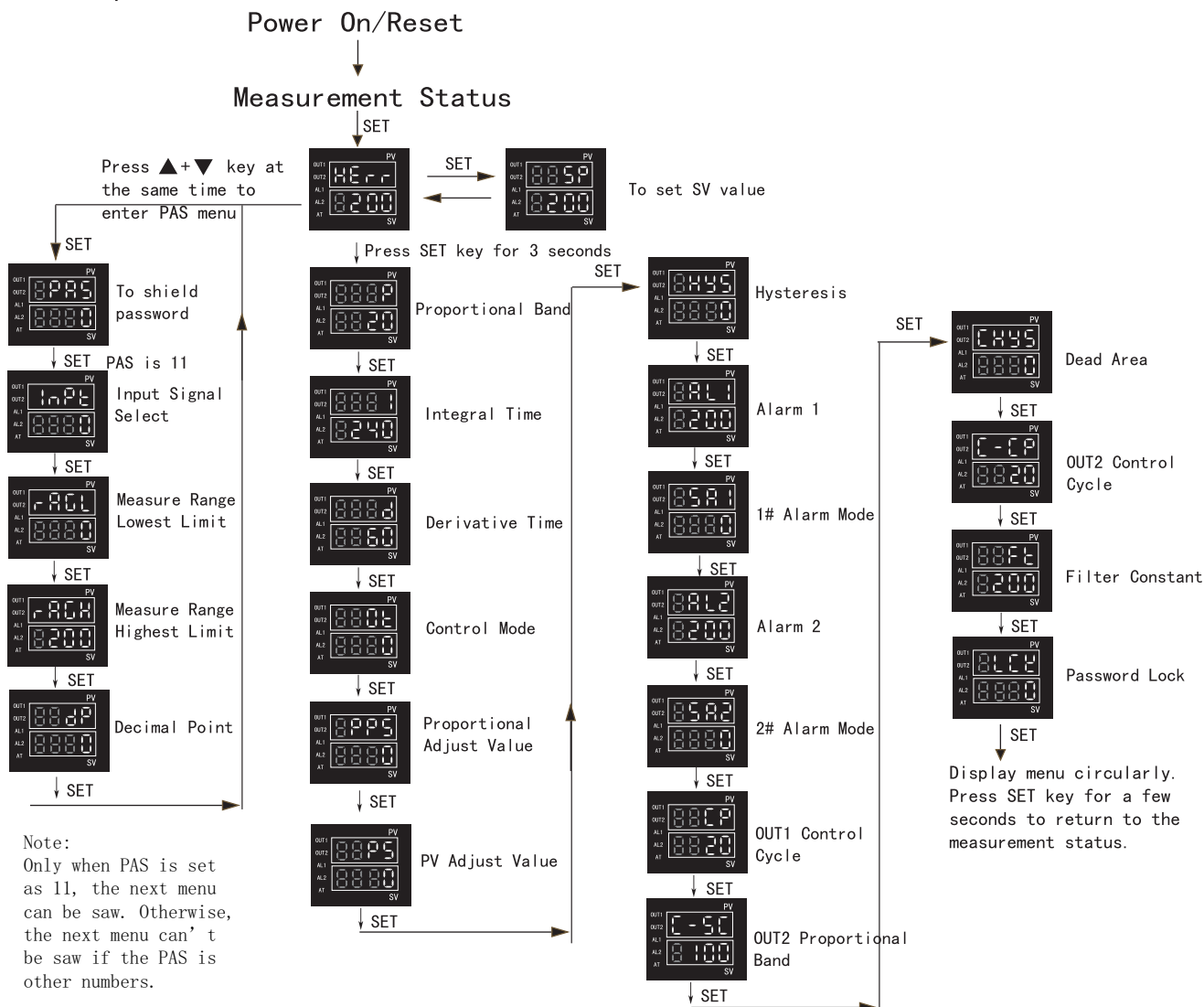
If users do not know how to set the PID value, they can use the Auto-tuning function of the product. The Auto-tuning function will calculate the P, I, D value it needs automatically as per different heating systems of users, and then adjust and control temperature automatically as per the calculated PID value.

Auto-tuning method: At first set the SV value, then press ▲ key or ▼ key for more than 3 seconds. Wait until the AT indicating lamp turning on, then release pressing. AT indicating lamp ON means Auto-tuning is running.

Please do not change SV value or other parameters on the controller to make sure the Auto-tuning gets an accuracy result. After the AT lamp turns off, the controller will refresh the P, I, D value automatically.

At this time, the controller can control temperature automatically and precisely.

5) Operation Sequence



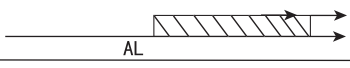
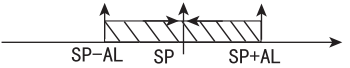
7) PID Control Menu

Parameter	Indication	Setting Range	Ex-Factory Setting
P	Proportional Band. The smaller the proportional band is, the faster the system heats. Instead, the slower the system heats. Increase the proportional band will decrease the oscillation, but increase control tolerance. Decrease the proportional band will decrease the control tolerance, but cause oscillation.	0-Highest Limit	20
I	Integral Time. The smaller the integral time is, the stronger the integral action is and better for eliminating the tolerance between it and the setting value. If the integral time is too short, it may not eliminate the tolerance.	0-3600S	240
D	Derivative Time. To decrease the derivative time to a proper value can prevent the system from oscillating. The bigger the D is, the stronger the derivative action is.	0-3600S	60
OUT	0:Proportional Control 1:Heating Control 2:Cooling (OUT1 Cooling)Control 3:Heating-Cooling Control (OUT1 Heating/OUT2 Cooling)	0-3	1
PPS	Proportional Amend Value applied to adjust static tolerance.	0-10	0
PS	PV value amending applied to amend the tolerance caused by measuring process.	-50-50	0
HYS	Proportional Control Hysteresis (OT is effective when it is set as 0)	0-25	0
RL1	Alarm 1# (Alarm hysteresis value is fixed at 0.6)	Lowest Limit-Highest Limit	200
SR1	Alarm 1# mode. Please refer to Alarm Parameter Table.	0-12	0
RL2	Alarm 2# (Alarm hysteresis value is fixed at 0.6) (TR4 does not have AL2)	Lowest Limit-Highest Limit	200
SR2	Alarm 2# mode. Please refer to Alarm Parameter Table. (TR4 does not have SA2)	0-6	0
CP	OUT1 Control Cycle. Relay Output>4, logic level output or pulse output must be set as 2, current output is set as 1.	1-120S	20
C-SC	Out2 output proportional band. Only effective in heating/cooling control.	1-600	20
CHYS	Dead area. When in heating/cooling control, the area that heating proportional band does not superpose cooling proportional band.	-10-10	0
C-CP	OUT2 Control Cycle. Only effective in heating/cooling control.	1-60S	20
Ft	Filter constant. The smaller Ft is, the faster response is, but may cause fluctuation.	0-255	60
LCV	0:Can change any parameters 1:Only can change SV value 2: Any change is prohibited	0-2	0

Measuring parameters setting menu

Parameter Name	Indication	Setting Range
INPT	Input signal select, please refer to input parameter table	0-12
RAGL	Measuring Range Lowest Limit	The Lowest Limit of input signal-RAGH
RAGH	Measuring Range Highest Limit	RAGL-The Highest Limit of input signal
DP	0:No decimal point 1:one digital decimal 2:two digital decimal (It is not effective for TC/RTD input.)	0-2

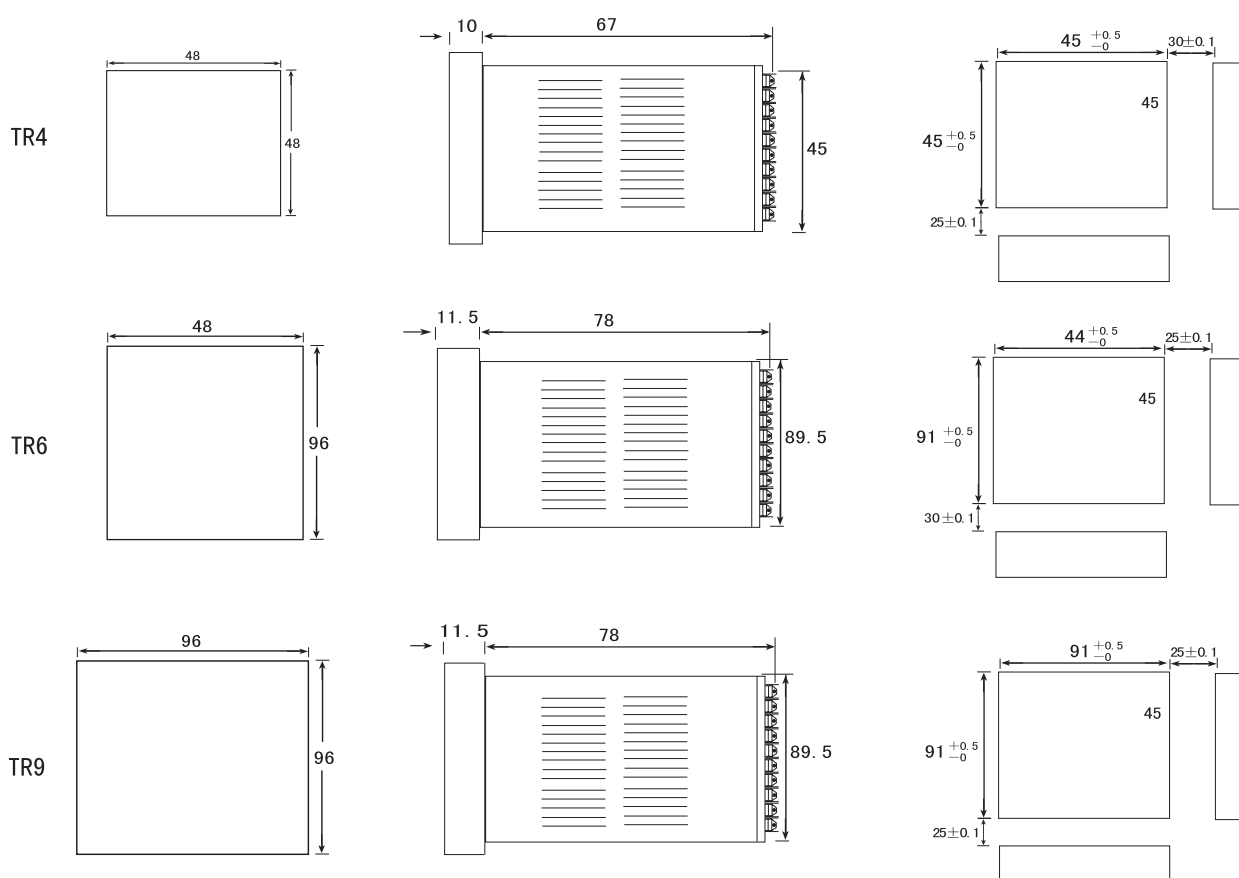
Alarm Parameter Table

Alarm Code	Alarm Mode	Alarm Output (AL1, AL2 is independent with each other) (SA1 and SA2 are the number between 1 to 6)
1	Highest Limit Absolute Value Alarm	
2	Lowest Limit Absolute Value Alarm	
3	Highest Limit Tolerance Value Alarm	
4	Lowest Limit Tolerance Value Alarm	
5	Highest/Lowest Limit Tolerance Value Alarm	
6	Highest/Lowest Limit Interzone Value Alarm	

Alarm Parameter Table

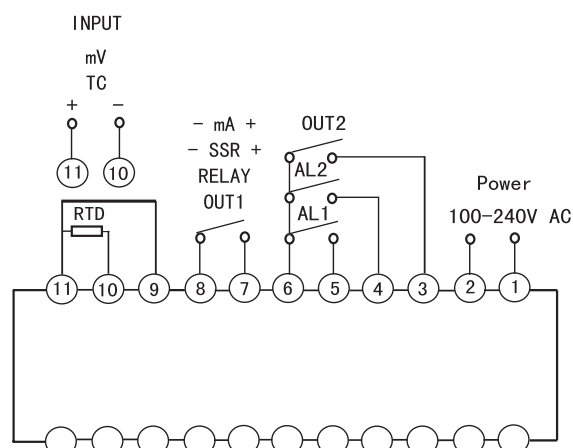
Alarm Code	Alarm Mode	The below two sets of alarm parameters(AL1,AL2)are used together. AL1 alarm outputs (SA1 is the number between 7 to 12), SA2 must be set as 0.
7	Highest/Lowest Limit Absolute Value Interzone Alarm	
8	Highest/Lowest Limit Tolerance Value Interzone Alarm	
9	Highest Limit Absolute Value & Lowest Limit Tolerance Value Interzone Alarm	
10	Highest Limit Tolerance Value & Lowest Limit Absolute Value Interzone Alarm	
11	Highest/Lowest Limit Absolute Value Alarm	
12	Highest/Lowest Limit Tolerance Value Alarm	

9) Outlook and Installation dimension

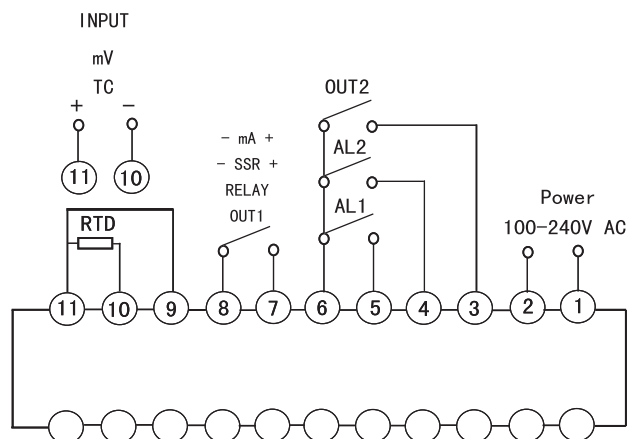


10) Connection drawing

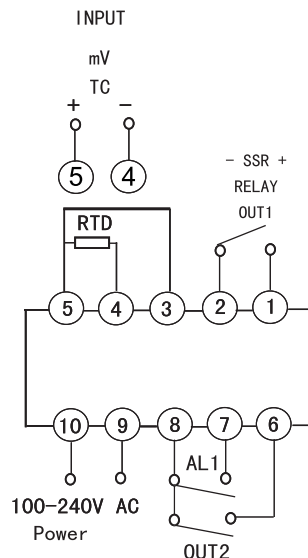
TR9 Power Supply:AC 100V-240V
Alarm Output:AV 250V 1A
(Resistance Load)
Relay Output:AC 250V 3A



TR6 Power Supply: AC 100V-240V
 Alarm Output: AV 250V 1A
 (Resistance Load)
 Relay Output: AC 250V 3A



TR4 Power Supply: AC 100V-240V
 Alarm Output: AV 250V 1A
 (Resistance Load)
 Relay Output: AC 250V 3A



11) Simple Trouble-Shooting Method

Displaying Message	Trouble-Shooting Method
Displaying HERR	No sensor connected or input signal is higher than the highest limit. To check the input signal & RAGH value & ambient temperature.
Displaying LERR	No sensor connected or input signal is lower than the lowest limit. To check the input signal & RAGL value & ambient temperature.

Toky Electrical Co., Ltd.

Add.: Civil Science & Technology Park, No.8 Minke West Road,
 Shiqi North District, Zhongshan, Guangdong, China.

Tel.: 86-760-3371808

Fax: 86-760-8722611

Contact: Mr. River Wong

E-mail: wm@toky.com.cn

TP Series Temperature Controller Manual

TP系列温控表



Features:

- ⊙ TC / RTD / Analog signal universal input, selected by software menu.
- ⊙ With display, alarm and adjusting function
- ⊙ Advanced Two Degrees of Freedom PID Arithmetic.
- ⊙ Auto-tuning function suitable to different system (Quick heating / cooling and Slow heating system)
- ⊙ Optional control output, modularization design.
- ⊙ Good anti-interference.
- ⊙ Switching power supply 100-240VAC.
- ⊙ Applied to system temperature control application.

For your safe, please read the below content carefully before you use the temperature controller!

■ Safe Caution

※	Please read the manual carefully before you use the temperature controller.
※	Please comply with the below important points.
⚠	Warning An accident may happen if the operation does not comply with the instruction.
⚠	Notice An operation that does not comply with the instruction may lead to product damage.
※	The instruction of the symbol in the manual is as below.
⚠	An accident danger may happen in a special condition.

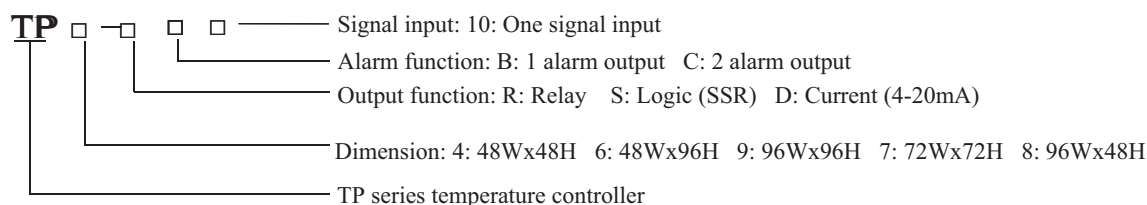
⚠ Warning

1. A safety protection equipment must be installed or please contact with us for the relative information if the product is used under the circumstance such as nuclear control, medical treatment equipment, automobile, train, airplane, aviation and equipment etc. Otherwise, it may cause serious loss, fire or person injury.
2. A panel must be installed, otherwise it may cause creepage (leakage).
3. Do not touch wire connectors when the power is on, otherwise you may get an electric shock.
4. Do not dismantle or modify the product. If you have to do so, please contact with us first. Otherwise it may cause electric shock and fire.
5. Please check the connection number while you connect the power supply wire or input signal, otherwise it may cause fire.

⚠ Caution

1. This product cannot be used outdoors. Otherwise the working life of the product will become shorter, or an electric shock accident may happen.
2. When you connect wire to the power input connectors or signal input connectors, the moment of the No.20 AWG (0.50 mm²) screw tweaked to the connector is 0.74N.m - 0.9N.m. Otherwise the connectors may be damaged or get fire.
3. Please comply with the rated specification. Otherwise it may cause electric shock or fire, and damage the product.
4. Do not use water or oil base cleaner to clean the product. Otherwise it may cause electric shock or fire and damage the product.
5. This product should be avoid working under the circumstance that is flammable, explosive, moist, under sunshine, heat radiation and vibration. Otherwise it may cause explosion.
6. In this unit it must not have dust or deposit, otherwise it may cause fire or mechanical malfunction.
7. Do not use gasoline, chemical solvent to clean the cover of the product because such solvent can damage it. Please use some soft cloth with water or alcohol to clean the plastic cover.

1. Model



2. Model Indication

Model	Alarm No.	Output	Dimension(mm)
TP4-RB10	1	Relay	48Hx48WX105L
TP4-SB10	1	Logic (SSR)	48Hx48WX105L
TP4-DB10	1	Current	48Hx48WX105L
TP6-RC10	2	Relay	96Hx48WX112L
TP6-SC10	2	Logic (SSR)	96Hx48WX112L
TP6-DC10	2	Current	96Hx48WX112L
TP9-RC10	2	Relay	96Hx96WX118L
TP9-SC10	2	Logic (SSR)	96Hx96WX118L
TP9-DC10	2	Current	96Hx96WX118L
TP7-RC10	2	Relay	72Hx72WX112L
TP7-SC10	2	Logic (SSR)	72Hx72WX112L
TP7-DC10	2	Current	72Hx72WX112L
TP8-RC10	2	Relay	48Hx96WX112L
TP8-SC10	2	Logic (SSR)	48Hx96WX112L
TP8-DC10	2	Current	48Hx96WX112L

3. Technical Parameters

1) Meter Parameters

Power Supply	100-240V AC/DC
Total Current	<30mA (220VAC)
Ambient Temperature	0-50℃
Ambient Humidity	45-85RH%

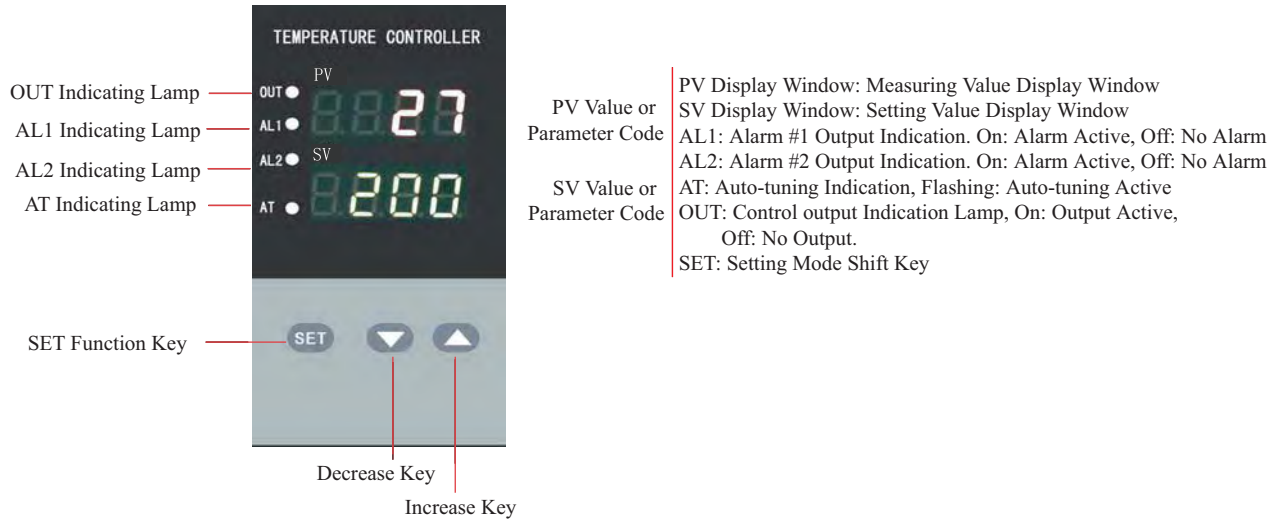
2) Input Signal

Code	Input type	Measuring range	Resolution	Accuracy	Input Impedance
0	S type TC	0-1600℃	1℃	0.5%FS±3digits	>100KΩ
1	B type TC	200-1800℃	1℃	0.5%FS±3digits	>100KΩ
2	K type TC	0-1300℃	1℃	0.5%FS±3digits	>100KΩ
3	E type TC	0-600℃	1℃	0.5%FS±3digits	>100KΩ
4	T type TC	0-300℃	1℃	0.5%FS±2digits	>100KΩ
5	J type TC	0-800℃	1℃	0.5%FS±3digits	>100KΩ
6	Reserved				
7	PT100 High Temperature	-200-800℃	0.1℃	0.5%FS±2digits	(0.2mA)
8	PT100 Low Temperature	-200-200℃	0.1℃	0.5%FS±1digits	(0.2mA)
9	CU50	-50-150℃	0.1℃	0.5%FS±1digits	(0.2mA)
10	0-20mV	0-20mV	10 digits AD	0.5%FS±3digits	>100KΩ
11	0-50mV	0-50mV	10 digits AD	0.5%FS±3digits	>100KΩ
12	Linear Resistance	0-400Ω	10 digits AD	1%FS±3digits	

3) Output control

Output Type	Capacity
Relay	Relay output, 3A/220VAC
Current	Current output, 4-20mA, load resistance Max.600Ω
Logic	DC 24V voltage, drive load 30mA

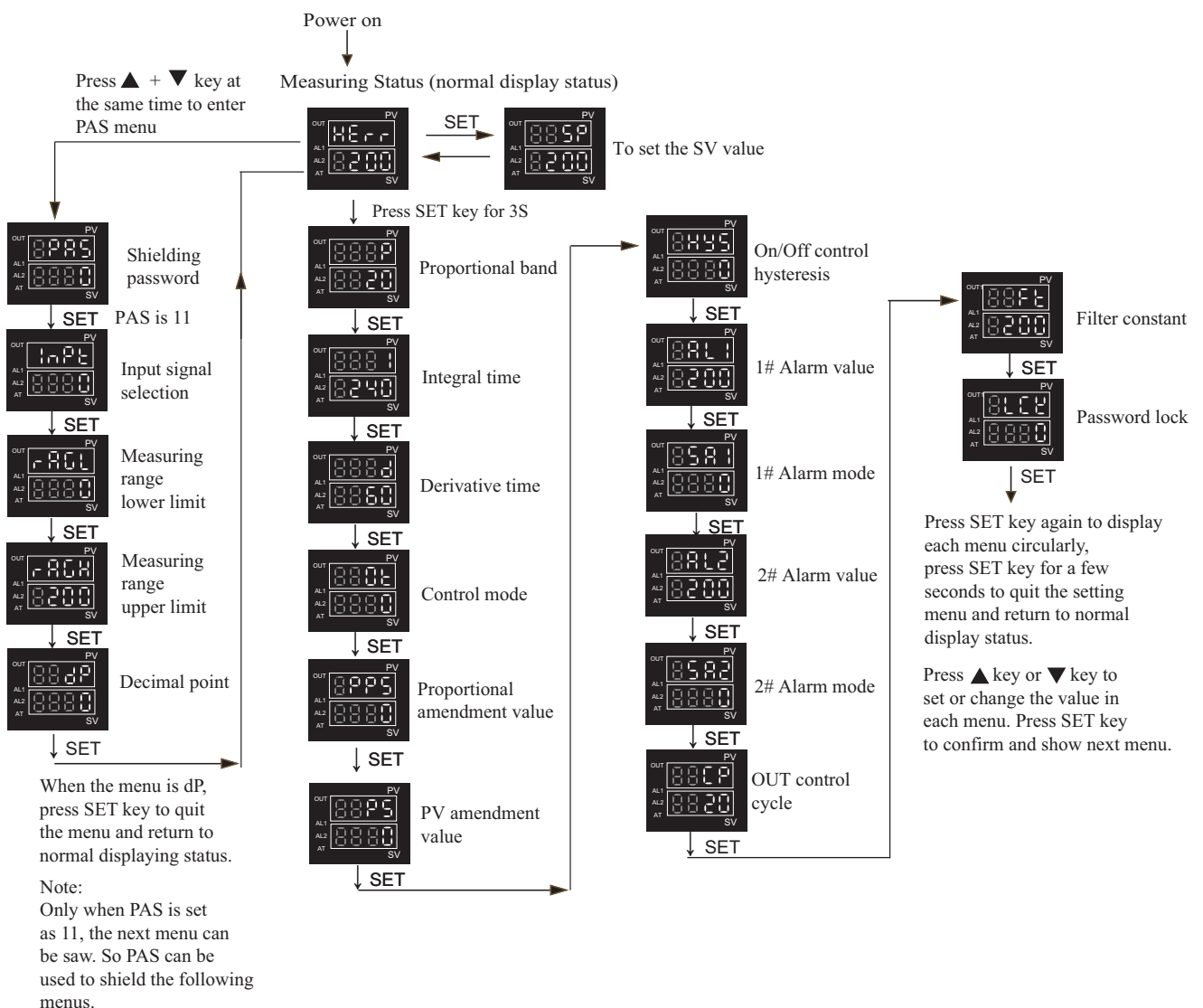
4. Panel



5. Panel Key Operation

- (1) SET Key: In normal display status, press SET Key to show SV modifying menu; press SET key for a few seconds to show setting menu.
- (2) “▲”, “▼” Key: Press ▲ or ▼ to set the value in SV value menu or setting menu.
- (3) “▲” Key: In normal display status, press it for a few seconds to start Auto-tuning applied to quick heating / cooling system (For raising temperature quickly).
- (4) “▼” Key: In normal display status, press it for a few seconds to start Auto-tuning applied to slow heating / cooling system (For small overshoot).

6. Operation Sequence



7. PID Control Menu

Parameter	Indication	Setting Range	Ex-Factory setting
P	Proportional Band. The smaller the proportional band is, the faster the system heats. Instead, the slower the system heats. Increase proportional band will decrease the oscillation, but increase control bias. Decrease proportional band will decrease control bias, but cause oscillation.	0-Upper Limit	20
I	Integral Time. The smaller the integral time is, the stronger the integral action is and better for eliminating the bias between it and the setting value. If the integral time is too short, it may not eliminate the bias.	0-3600	240
D	Derivative Time. To decrease the derivative time to a proper value can prevent the system from oscillating. The bigger the D is, the stronger the derivative action is.	0-3600	60
o t	0: On / Off control 1: Heating control 2: Cooling control	0-2	1
PPS	Proportional amendment value for amending static bias.	0-10	0
PS	PV amendment value for amending the bias caused by the measuring process.	-50-50	0
HYS	On / Off control hysteresis (It is effective when o t is set as 0.)	0-25	0
AL1	Alarm #1 (Alarm hysteresis value is fixed at 0.6)	Lower limit - Upper limit	200
SR1	Alarm #1 mode (Please refer to alarm parameter table)	0-12	0
AL2	Alarm #2 (Alarm hysteresis value is fixed at 0.6)	Lower limit - Upper limit	200
SR2	Alarm #2 mode (Please refer to alarm parameter table)	0-6	0
CP	OUT control cycle. For relay output, it is bigger than 4; for logic or pulse output, it is 2; for current output, it is 1.	1-120S	20
Ft	Filter constant. The smaller Ft is, the faster response is, but it may cause fluctuation.	0-255	60
LCE	0: Allowed to change all parameters; 1: Only for SV value change; 2:Any change prohibited	0-2	0

Measuring parameters setting menu

Parameter	Indication	Setting range
INPT	Input signal selection, please refer to Input parameter table	0-12
RAGL	Lower limit of measuring range	Lower limit of input signal-RAGH
RAGH	Upper limit of measuring range	RAGL-Upper limit of input signal
DP	0:No decimal point 1: 1 digit decimal point 2: 2 digit decimal point (Not effective for TC/RTD input)	0-2

Alarm parameters table

Alarm code	Alarm mode	Alarm output(AL1, AL2 has no relation with each other)
1	Upper limit absolute alarm	
2	Lower limit absolute alarm	
3	Upper limit relative alarm	
4	Lower limit relative alarm	
5	Upper / Lower limit relative alarm	
6	Upper / Lower limit zone alarm	

Alarm parameters table

Alarm code	Alarm mode	AL1, AL2 are used together, AL1 alarm output, AD2 must be set as 0
7	Upper and Lower limit absolute zone alarm	
8	Upper and Lower limit relative zone alarm	
9	Upper limit absolute and Lower limit relative zone alarm	
10	Upper limit relative and Lower limit absolute zone alarm	
11	Upper / Lower limit absolute alarm	
12	Upper / Lower limit relative alarm	

8. Advanced Function

The setting of P.I.D parameters & Auto-tuning operation

1. To set P.I.D parameters manually:

A default PID value has been set before the controller is ex-factory. This P.I.D value is applied to normal heating, cooling system for temperature control. If the performance is not so good with the default P.I.D, the value can be changed manually for the users who have some automation control theory and experience.

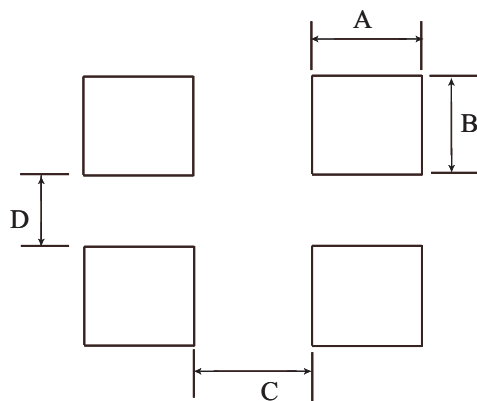
2. To set P.I.D parameters automatically:

If users do not know how to set P.I.D parameters, they can use the Auto-tuning function of the controller. Auto-tuning function is that the controller calculates the P, I, D value according to the specific heating system, and then controls temperature automatically as per the P, I, D value it gets.

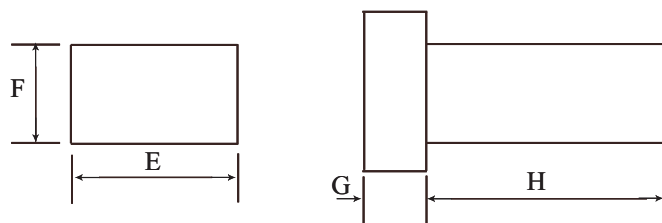
Auto-tuning method: At first set the SV value, press ▲ key or ▼ key for 3 seconds until “AT” indicating lamp turns on,. “AT” lamp on means Auto-tuning is running. At this moment please don't change the SV value or any parameters on the machines / equipments in order to make sure the Auto-tuning accuracy. After “AT” lamp turns off, the controller will refresh the P.I.D value automatically. At this moment, the controller can control temperature automatically and accurately.

9. Mounting Dimension

1. Mounting



2. Dimension

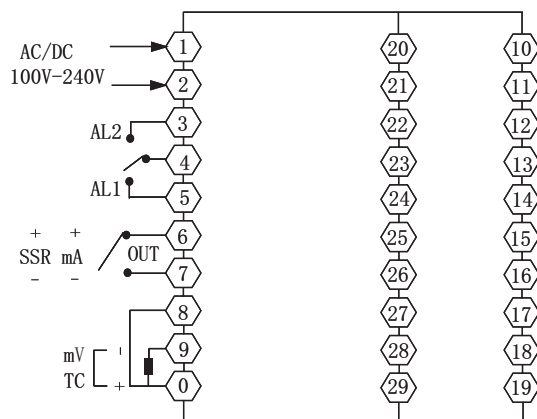


3. The dimension list of TP models:

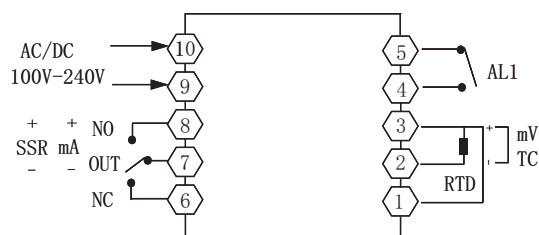
Model \ Size	A	B	C	D	E	F	G	H
TP4	44+0.5	44+0.5	30	25	48	48	5	100
TP6	44+0.5	91+0.5	25	30	48	96	12	100
TP7	67.5+0.8	67.5+0.8	30	25	72	72	12	100
TP9	91+0.5	91+0.5	25	25	96	96	18	100
TP8	91+0.5	44+0.5	25	30	96	48	12	100

10. Connection drawing

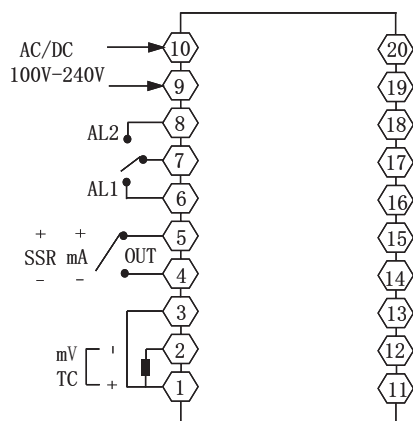
TP9 Power Supply: AC/DC 100V-240V
Alarm Output: AC 250V 1A
(Resistance Load)
Voltage Control Output: DC 24V 30mA
Current Control Output: 4-20mA
Relay Control Output: AC 250V 3A



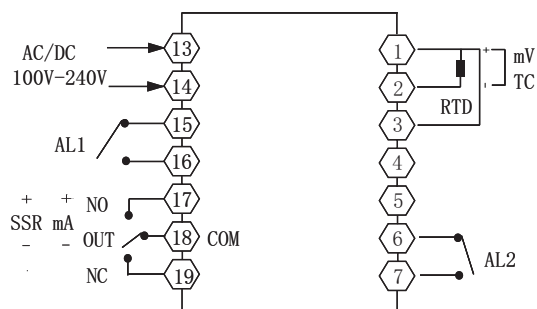
TP4 Power Supply: AC/DC 100V-240V
Alarm Output: AC 250V 1A
(Resistance Load)
Voltage Control Output: DC 24V 30mA
Current Control Output: 4-20mA
Relay Control Output: AC 250V 3A



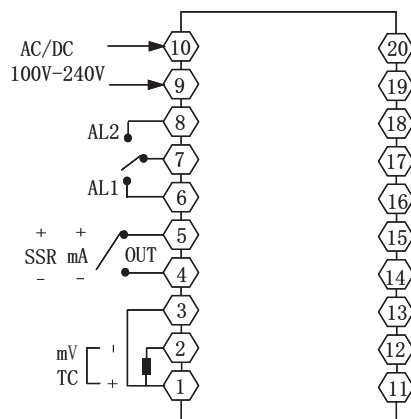
TP6 Power Supply: AC/DC 100V-240V
Alarm Output: AC 250V 1A
(Resistance Load)
Voltage Control Output: DC 24V 30mA
Current Control Output: 4-20mA
Relay Control Output: AC 250V 3A



TP7 Power Supply: AC/DC 100V-240V
Alarm Output: AC 250V 1A
(Resistance Load)
Voltage Control Output: DC 24V 30mA
Current Control Output: 4-20mA
Relay Control Output: AC 250V 3A



TP8 Power Supply: AC/DC 100V-240V
Alarm Output: AC 250V 1A
(Resistance Load)
Voltage Control Output: DC 24V 30mA
Current Control Output: 4-20mA
Relay Control Output: AC 250V 3A



11. Simple Problem Shooting

Display Message	Shooting Method
Display HERR	Input disconnect or over upper limit, please check input signal, RAGH value and ambient temperature.
Display LERR	Input disconnect or under lower limit, please check input signal, RAGL value and ambient temperature.

TX3 Series Delicate Temperature Controller Manual



Features:

1. Temperature Display/Control Function.
2. Manual/Automatic Heating Defrosting Function.
3. Stop Defrosting as per setting time or temperature function.
4. Setting Memory Function. Data can be saved for 10 years.
5. Password Protection Function.
6. Sensor Disconnect Protection/Malfunction Display.
7. Fan Control Function.

For your safe, please read the below content carefully before you use the temperature controller!

■ Safe Caution

※ Please read the manual carefully before you use the temperature controller!

Please comply with the below important points:

⚠ Warning An accident may happen if the operation does not comply with the instruction.

⚠ Notice An operation that does not comply with the instruction may lead to product damage.

※ The instruction of the symbol in the manual is as below:

⚠ An accident danger may happen in a special condition.

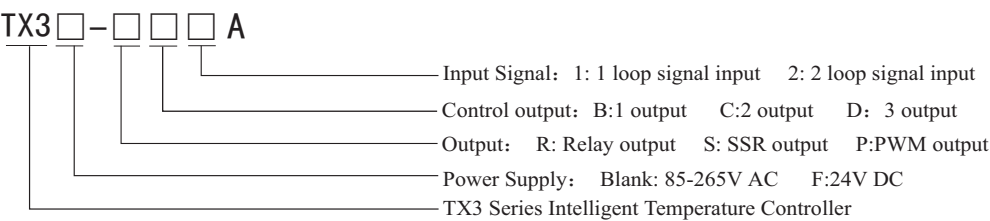
⚠ Warning

1. A safety protection equipment must be installed or please contact with us for the relative information if the product is used under the circumstance such as nuclear control, medical treatment equipment, automobile, train, airplane, aviation, entertainment or safety equipment, etc. Otherwise, it may cause serious loss, fire or person injury.
2. A panel must be installed, otherwise it may cause creepage (leakage).
3. Do not touch wire connectors when the power is on, otherwise you may get an electric shock.
4. Do not dismantle or modify the product. If you have to do so, please contact with us first. Otherwise it may cause electric shock and fire.
5. Please check the connection number while you connect the power supply wire or input signal, otherwise it may cause fire.

⚠ Caution

1. This product cannot be used outdoors. Otherwise the working life of the product will become shorter, or an electric shock accident may happen.
2. When you connect wire to the power input connectors or signal input connectors, the moment of the No.20 AWG (0.50 mm²) screw tweaked to the connector is 0.74N.m - 0.9N.m. Otherwise the connectors may be damaged or get fire.
3. Please comply with the rated specification. Otherwise it may cause fire after the working life of the product becomes shorter.
4. Do not use water or oil base cleaner to clean the product. Otherwise it may cause electric shock or fire, and damage the product.
5. This product should be avoid working under the circumstance that is flammable, explosive, moist, under sunshine, heat radiation and vibration. Otherwise it may cause explosion.
6. In this unit it must not have dust or deposit, otherwise it may cause fire or mechanical malfunction.
7. Do not use gasoline, chemical solvent to clean the cover of the product because such solvent can damage it. Please use some soft cloth with water or alcohol to clean the plastic cover.

1. Model Indication



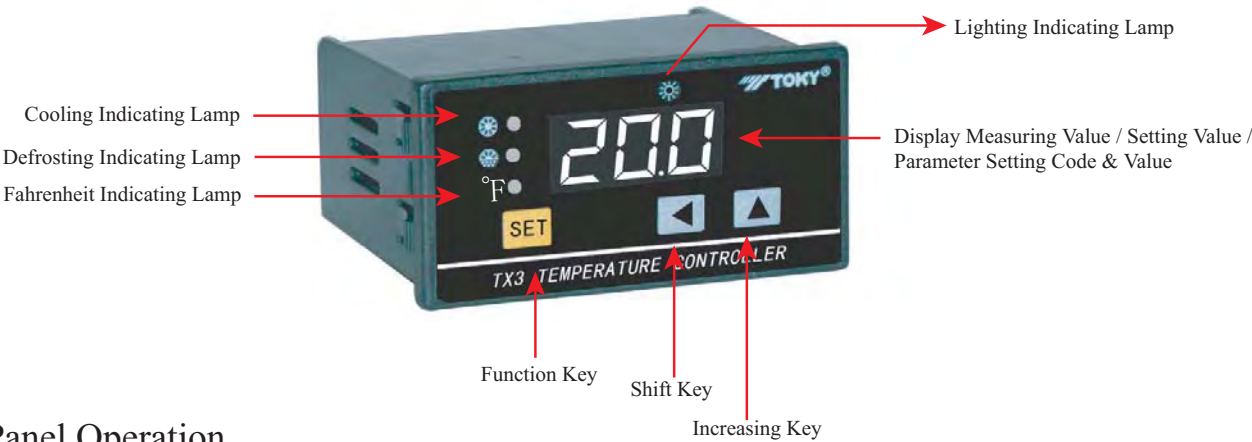
2. Model & Function

No.	Model	Function (Room temperature refers to the inside temperature of a refrigerator or cooler, etc.)
1	TX3-RC1A	Room temperature input, Compressor output & Floodlight output
2	TX3-RC2A	Room temperature & Defrosting temperature input, Compressor & Defrosting output
3	TX3-RD1A	Room temperature input, Compressor & Floodlight & Defrosting output
4	TX3-RD2A	Room temperature & Defrosting temperature input, Compressor & Floodlight & Defrosting output

3. Technical Parameters

Power Supply	85~265V AC 50/60Hz
Power Consumption	<5W
Ambient Temperature	0℃~50℃
Ambient Humidity	<80%RH
Control Temperature Range	-40℃~45℃
Measuring Range	-40℃~99℃
Input Signal	2 loop NTC Thermistor (Thermal Resistor, for room & defrosting temperature)
Resolution	Display:±0.1℃
Sampling Cycle	<0.1S
Output	Relay output, SSR output
Relay Output	Compressor Relay 10A/300V AC Fan/Defrosting 3A/220V AC
Insulating Resistance	≥100MΩ DC 500V
Interference	Power 2000V p-p
Measuring Accuracy	±0.5℃
Dielectric Strength	1600V AC / 1 min.
Dimension(mm)	72W×36H×58L

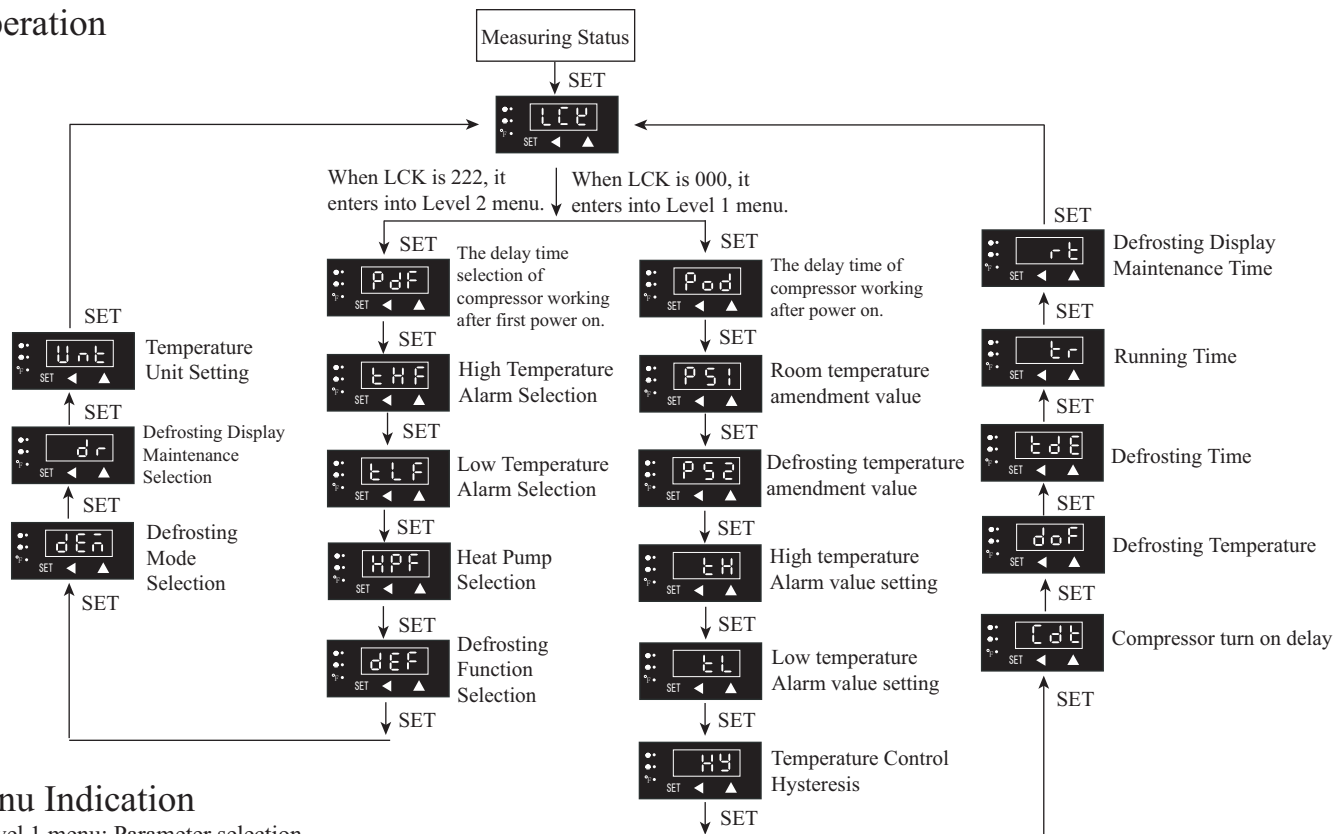
4. Panel Indication



5. Panel Operation

- 1) The setting method of temperature
- A: Pressing ◀ key to display the setting temperature. The cooling & defrosting indicating lamps flash quickly at the same time.
 - B: Pressing ◀ key again to change the flickering digit, pressing ▲ key to change the flickering value, pressing ◀ key to shift the flickering digit from right to left.
 - C: Pressing SET key to stop flickering.
 - D: Pressing SET key again to quit temperature setting, the data modified is saved and the display screen returns to temperature measuring status.
 - E: If no key pressing for a long time when the controller is in the temperature setting status, it will return to temperature measuring status automatically.

6. Operation



7. Menu Indication

1. Level 1 menu: Parameter selection

Parameter PAR	Display	Definition	Setting Range	Ex-factory Setting
1	LCK	Password Lock	000~999	000
2	Pod	Delay time of compressor after power on	0~30 minutes	2
3	PS1	Amendment of Room temperature	-9.9℃~9.9℃	0
4	PS2	Amendment of Defrosting temperature	-9.9℃~9.9℃	0
5	TH	The Upper limit of controlled temperature	Setting temperature~45℃	20℃
6	TL	The Lower limit of controlled temperature	-40℃~Setting temperature	-35℃
7	HY	The hysteresis of controlled temperature	0℃~10℃	4℃
8	CDT	Delay time of compressor starts up	0~15 minutes	3 minutes
9	Dof	Defrosting temperature	0℃~15℃	8℃
10	Tde	Defrosting time	1~99 minutes	20 minutes
11	Tr	Running time of working compressor	0~24 hours	6 hours
12	rt	Maintenance time of defrosting display	0~30 minutes	20 minutes

2. Level 2 menu: Function selection

Parameter PAR	Display	Definition	The first level menu to be affected	Setting range	Ex-factory setting
1	PDF	Delay time of compressor after power on	2 (Pod)	Yes/No	Yes
2	THF	High temperature alarm function	5 (TH)	Yes/No	Yes
3	TLF	Low temperature alarm function	6 (TL)	Yes/No	Yes
4	HPF	Heat pump selection	8、9、10、11、12	Yes/No	Yes
5	DEF	Defrosting function	9、10、11	Yes/No	Yes
6	DEM	Defrosting Mode	9 (Dof)	Yes/No	Yes
7	DR	Defrosting display maintenance	12 (rt)	Yes/No	Yes
8	UNT	Temperature unit	All tempearture value	C/F	C

Supplement for the above table (How the first level menu is affected by the setting of second level menu.)

- A. No POD menu is displayed if PDF is set as NO.
- B. No High Temperature Function or TH menu if THF is set as NO. (Note:The controller just displays UUU if the alarm menu is effective, at this time, the measuring range is the limit range of TH, TL.)
- C. No Low Temperature Function or TL menu if TLF is set as NO. (Note:The controller just displays nnn if the alarm menu is effective, at this time, the measuring range is the limit range of TH, TL.)
- D. No Heat Pump Function if HPF is set as NO., i.e. No compressor, No CDT、Dof、Tde、Tr、rt menu.
- E. No Defrosting Function or Dof、Tde、Tr menu if DEF is set as NO.
- F. DEM is for Defrosting Mode selection. NO means Timing Defrosting, no Dof menu. It will change to Timing Defrosting automatically when it detects that the defrosting temperature sensor is not connected or has short circuit.
- G.DR is for temperature maintenance function when defrosting. If DR is set as NO, room temperature is displayed truly, no rt menu.

3. Press SET key for more than 5S, then enter to level 1 menu.
4. When the controller display LCK value, set the value as 222, and then press SET key to enter level 2 menu.
5. In the level 2 menu, after all the menus are finished setting, press SET key to return to level 1 menu, LCK value returns to 000 automatically.
6. In all menus, press SET key for more than 5S to save the parameters and return to common measuring status.
7. In all menus, if no key press within 1 minute, the parameter setting is ineffective, and the program returns to common measuring status.
8. In the measuring status, press SET + ▲ key for 5S to start defrosting. During the defrosting process, press SET + ▲ key for 5S to stop the defrosting manually.
9. In the measuring status, press ▲ key to display defrosting sensor temperature, release ▲ key to return to room temperature measuring status.
10. Press ▲ key for 5S to display HT (Highest temperature), LT (Lowest temperature) and AT (average temperature).

8. Control Function

1. Compressor Delay Protection:

- a) Power on delay: After the machine is power on, it will enter cooling status after the delay time of POD if the room temperature value is bigger than the setting SV.
- b) During the temperature controlling process, the compressor cannot be restarted until it stops running for the time of CDT.

2. Temperature Control:

- a) When the room temperature is higher than the controlled temperature + temperature difference, if the shut down time of compressor does not reach CDT value, the cooling indicating lamp flickers till the delay time is reached, the cooling indicating lamp turns on, the compressor starts running. After the room temperature is lower than the controlled temperature, the compressor stops running.
- b) When it finds the room temperature sensor short circuit or disconnecting, it displays ED, and starts the timing cooling process automatically, the compressor runs 45 min and pauses 15 min.

3. Electrothermal defrosting control

a) Starting defrosting

- i. When it finds the defrosting temperature is lower than Dof, and the lasting time reaches Tr, it starts defrosting automatically.
- ii. If the defrosting temperature sensor has malfunction, the controller starts timing defrosting mode, and the defrosting will be started after the controller runs for Tr time.
- iii. During normal running, press SET + ◀ key (Press SET key and then press ◀ key quickly), the meter starts defrosting automatically after 5 seconds.
- iv. When starting defrosting, the compressor stops running, the heating thread is power on and heating.

b) Stopping Defrosting:

- i. When it detects the defrosting temperature and finds it is bigger than Dof, it stops defrosting automatically.
- ii. When the defrosting time reaches TDE, the controllers stops defrosting automatically.
- iii. During defrosting, press SET + ◀ key (press SET key and then press ◀ key quickly) for 5 seconds to stop defrosting.
- iv. When the defrosting stops, the heating thread is power off.
- c) Stopping Defrosting: After the defrosting stops, the system will return to normal working status after the delay of 2 minutes water drip.
- d) Defrosting temperature Lock: If the parameter DR displays the room temperature at the moment when the controller starts defrosting and it is locked, after the defrosting finishes and the systems runs for the time of Rt, the controller returns to display the actual room temperature.

4. Room temperature statistical function

- a) Automatically record the highest/lowest/average room temperature, press UP key for 5 second to display HT and the statistical value:

▲5S ◀ SET ◀ SET ◀ SET SET
Measuring Status → HT → HT Value → LT → LT value → AT → AT value → CLR → measuring status

HT: The highest room temperature LT: The lowest room temperature AT: The average room temperature CLR: To clean historical record menu

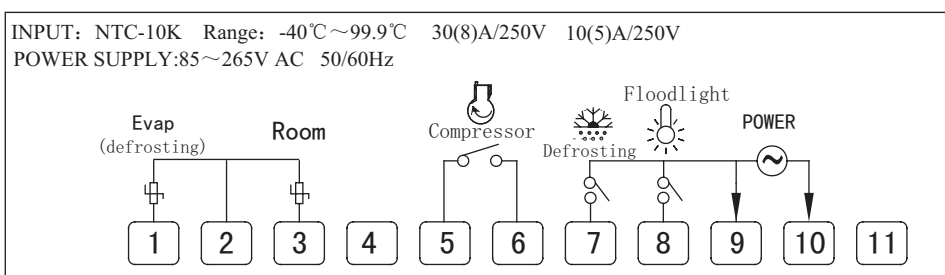
- b) HT, LT and AT do not reponse to the temperature value that changes instantly, the detecting cycle is 1 minute, i.e., it takes an average temperature value within 1 min. as a measured value.

- c) When it displays CLR, press ▲ key to show OK, and clean the historical record, and do the statistic for new data.

5. Sensor Amendment Function:

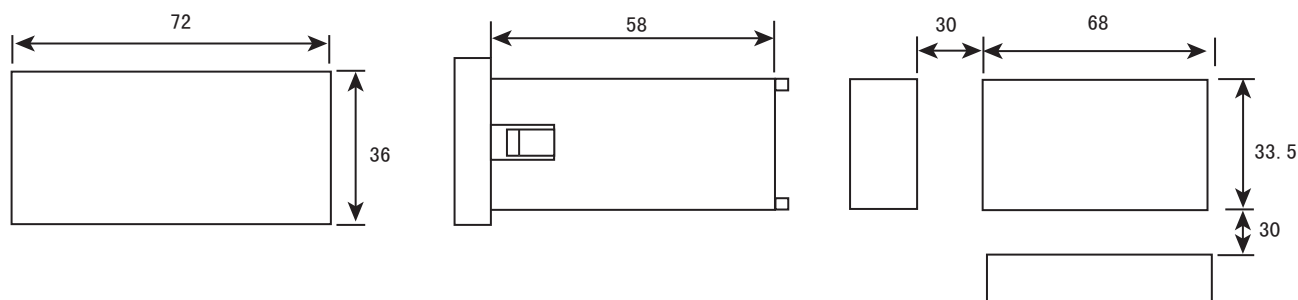
- a) Subject: To amend the temperature difference caused by different environment, or the function change of the sensor itself during actual measuring.
- b) To enter the menu, and adjust PS1 and PS2 to amend the sensor.

9. Connection



Please subject to the connection drawing on the meter if any changes.

10. Dimension



TOKY ELECRITICAL CO.,LTD

Add.: Civil Science & Technology Park, No.3 Minke West Road,
Shiqi North District, Zhongshan, Guangdong, China.

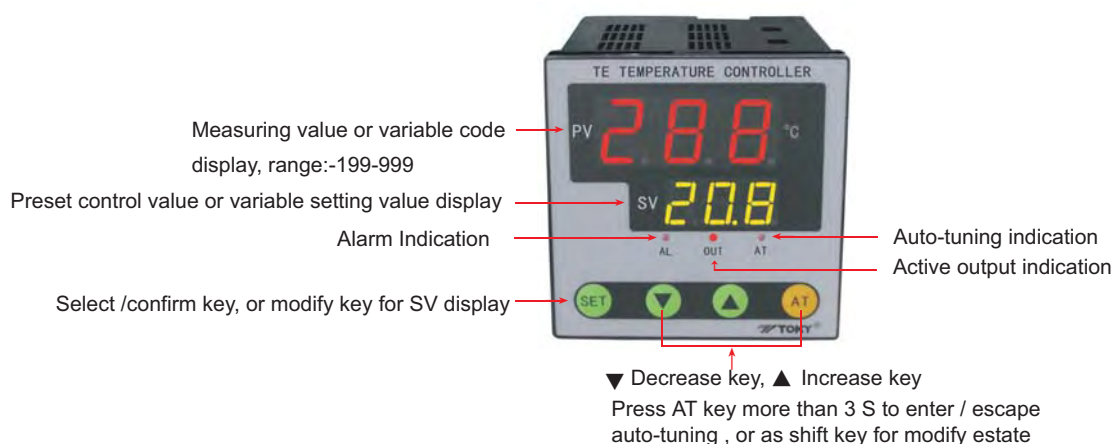
Tel.: 86-760-3371808 Fax: 86-760-8722611

Web: www.toky.com.cn E-mail: wm@toky.com.cn

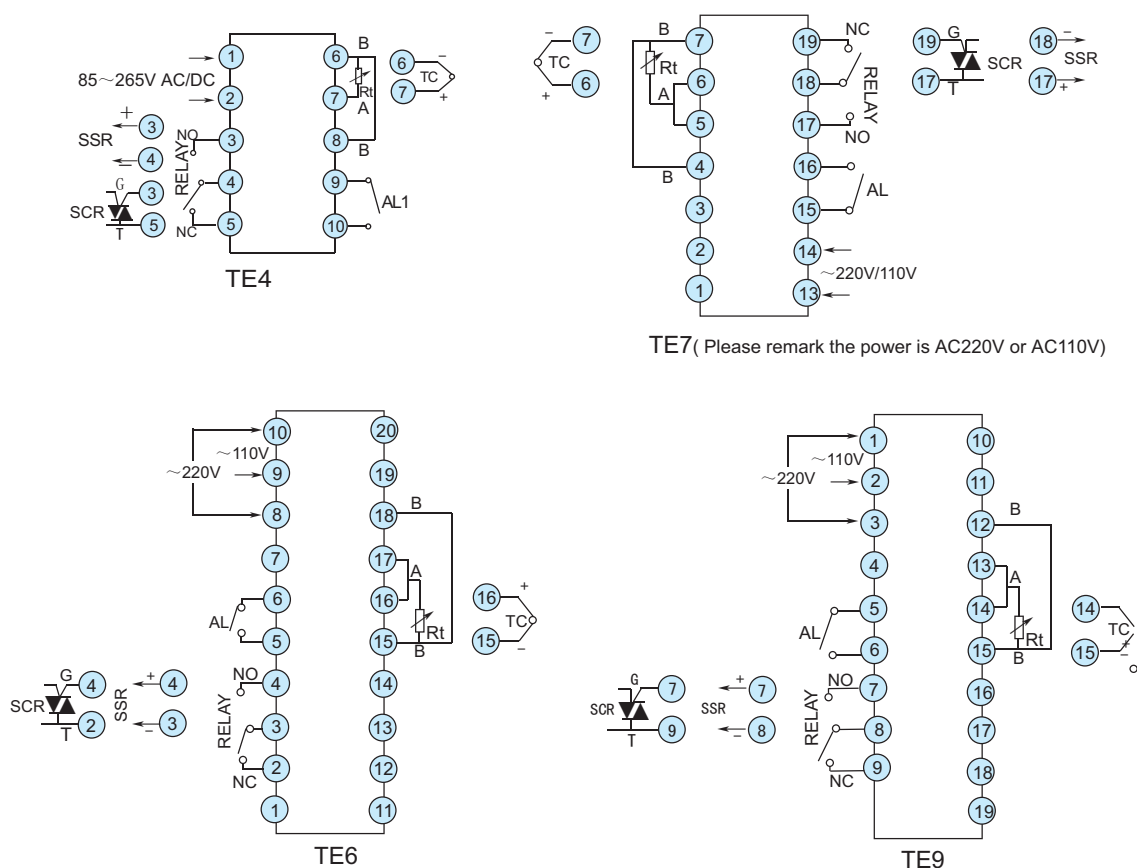
Power Supply	110V/220V±10%AC/DC (TE4:85-265VAC)
Power Consumption	5W
Ambient Temperature	0℃-50℃
Ambient Humidity	<80%RH
Measuring Accuracy	±0.5%FS
Temperature Drift	±3dight
Input type	K,E,T,J ,PT100,CU100 universal RTD/TC.Special ordered for CU50 input.
Resolution	1℃@TC,0.1℃@RTD
Sampling Time	0.5 S

Control Output	Relay /SCR / SSR
Relay Capacity	250V AC 3A, or 30 VDC 3A
SCR Control Output	Activating single/double SCR directly
4-20mA Current Output	None
SSR Control Output	12VDC or 24VDC, I _{max} =30mA
Control Mode	ON-OFF/normal PID/auto-tuning PID control
Alarm Type	Single alarm, optional upper (lower) limit alarm, upper (lower) error alarm
Control Cycle	1-250S select by customers
Data Writing Life	1,000,000 times
Dimension	48H×48W×100L 96H×48W×100L 72H×72W×100L 96H×96W×100L

PANEL ILLUSTRATION



CONNECTION DIAGRAM



Note: please refer to the diagram sticking on the enclosure if any changes

TX3 COMPACT SIZE TEMPERATURE CONTROLLER

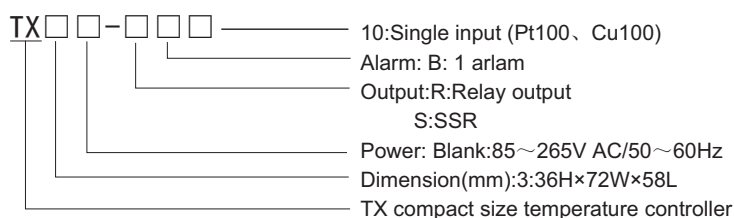


FEATURE

- ⊙ Compact size
- ⊙ Various RTD input, widely application
- ⊙ ON-OFF/normal PID/auto-tuning PID control
- ⊙ Optional control output: Relay , SSR

Applications: Widely applied in chemical, petrochemical, thermal power, metallurgy ,pharmacy, light industry, machinery, heat treatment and lab equipments for temperature indicate and control.

CODE ILLUSTRATION



* SCR output or Cu 50 input should be special ordered.

ORDERING CODE

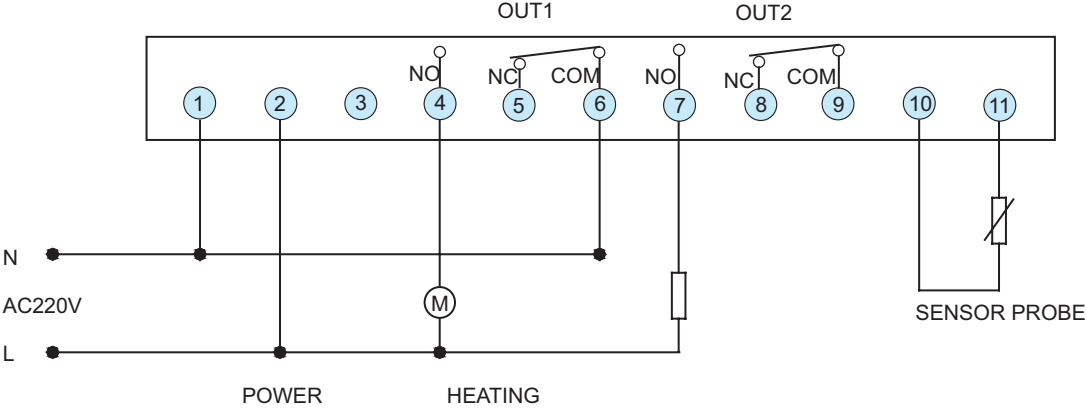
Code	Control Ouput	Alarm Output	Accuracy	Power	Input Type
TX3-RB10	Relay	Up or Down	±0.5%FS±2digit	85~265V AC/DC	Pt100/Cu100
TX3-SB10	SSR	Up or Down	±0.5%FS±2digit	85~265V AC/DC	

* The default input is Pt100

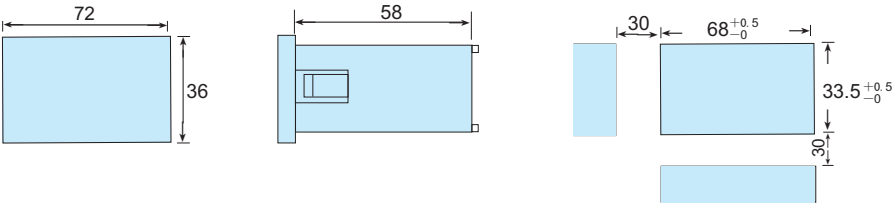
TECHNICAL SPECIFICATION

Power Supply	85-265V AC or 24V DC
Power Consumption	5W
Ambient Temperature	0℃-50℃
Ambient Humidity	<80%RH
Measuring Accuracy	±0.5%FS
Temperature Drift	±3dight
Input type	PT100/CU100
Resolution	0.1℃
Sampling Time	0.5 S
Control Output	Relay / SSR
Relay Rating	250V AC 3A, or 30 VDC 3A
SCR Control Output	None
4-20mA Current Outpput	12VDC or 24VDC, I _{max} =30mA
SSR Control Output	ON-OFF/normal PID/auto-tuning PID control
Control Mode	ON-OFF/normal PID/auto-tuning PID control
Control Cycle	0-250S select by customers
Alarm Type	Single alarm, optional
Data Writing Life	1,000,000 times
Communication	None
Dimensions	36H×72W×58L

CONNECTION DIAGRAM



DIMENSIONS AND CUT-OUT



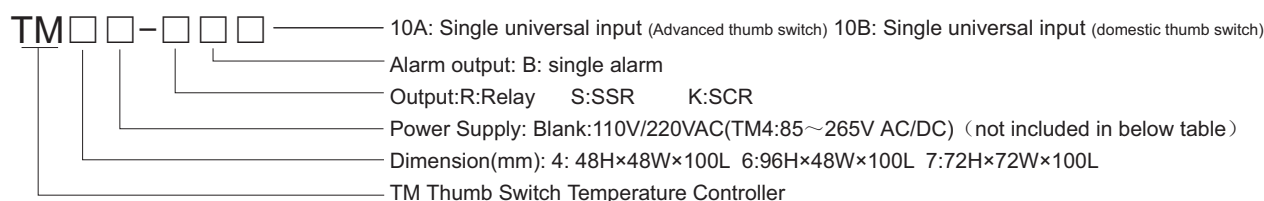
TM THUMB SWITCH TEMPERATURE CONTROLLER (PATENT PRODUCT)



FEATURE

- ⊙ 3 digits LED display
- ⊙ Thumb switch setting, minus temperature control available
- ⊙ TC/RTD universal input optional
- ⊙ PID auto-tuning, get the PID value automatically
- ⊙ Various control output modified by modules
- ⊙ Single alarm
- ⊙ Simple operating, used for temperature measure, control and alarm

CODE ILLUSTRATION



ORDERING CODE

Code	Alarm	Thumb Switch	Control Output	Power Supply	Input Type
TM□-RB10A	Single Alarm	Top-quality	Relay Output	Blank: 110V/220V*	K, J, E, T Pt100, Cu100
TM□-SB10A	Single Alarm	Top-quality	SSR Output	Blank: 110V/220V*	
TM□-KB10A	Single Alarm	Top-quality	SCR Output Relay Output	Blank: 110V/220V*	
TM□-RB10B	Single Alarm	Domestic	Relay Output	Blank: 110V/220V*	
TM□-SB10B	Single Alarm	Domestic	SSR Output	Blank: 110V/220V*	
TM□-KB10B	Single Alarm	Domestic	SCR Output	Blank: 110V/220V*	

* □: denote the dimension 4, 6, 7 optional, eg: 7: 72H×72W×100L * TM4 power supply: 85~265V AC/DC

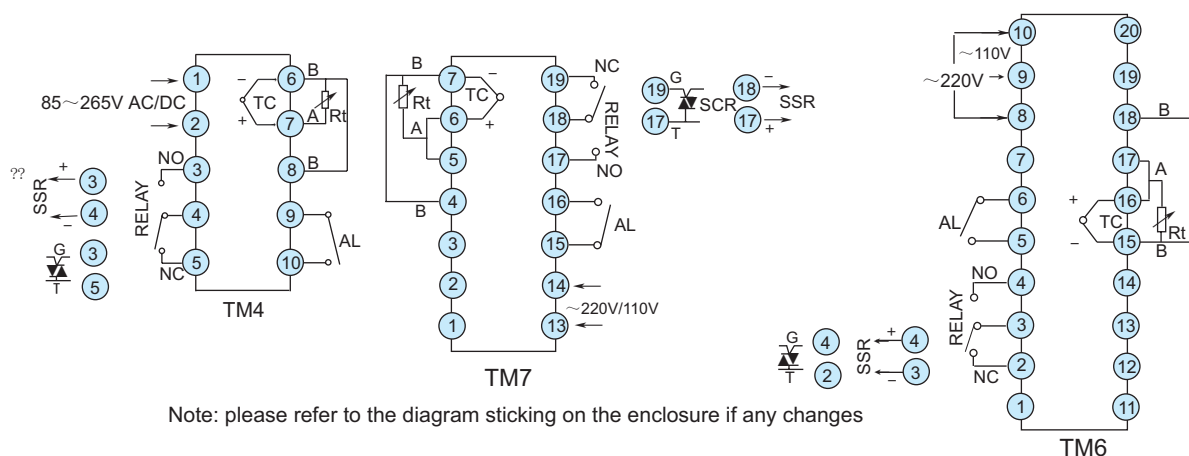
TECHNICAL SPECIFICATION

Power Supply	110V/220V±10%AC/DC (TM4: 85-265Vac)
Power Consumption	5W
Ambient Temperature	0℃-50℃
Ambient Humidity	<80%RH
Measuring Accuracy	±0.5%FS
Temperature Drift	±3digit
Input type	K, E, T, J, PT100, CU100 universal RTD/TC. Special order for CU50 input.
Resolution	1℃@TC, 0.1℃@RTD
Sampling Time	0.5 S
Control Output	Relay /SCR / SSR
Relay Capacity	250V AC 3A, or 30 VDC 3A
SCR Control Output	Activating single/double SCR directly
4-20mA Current Output	None
SSR Control Output	12VDC or 24VDC, I _{max} =30mA
Control Mode	ON-OFF/Normal PID/Auto-tuning PID control
Alarm Type	Single upper limit alarm
Control Cycle	0-250S select by customers
Data Writing Life	1,000,000 times
Dimensions	48H×48W×100L 96H×48W×100L 72H×72W×100L

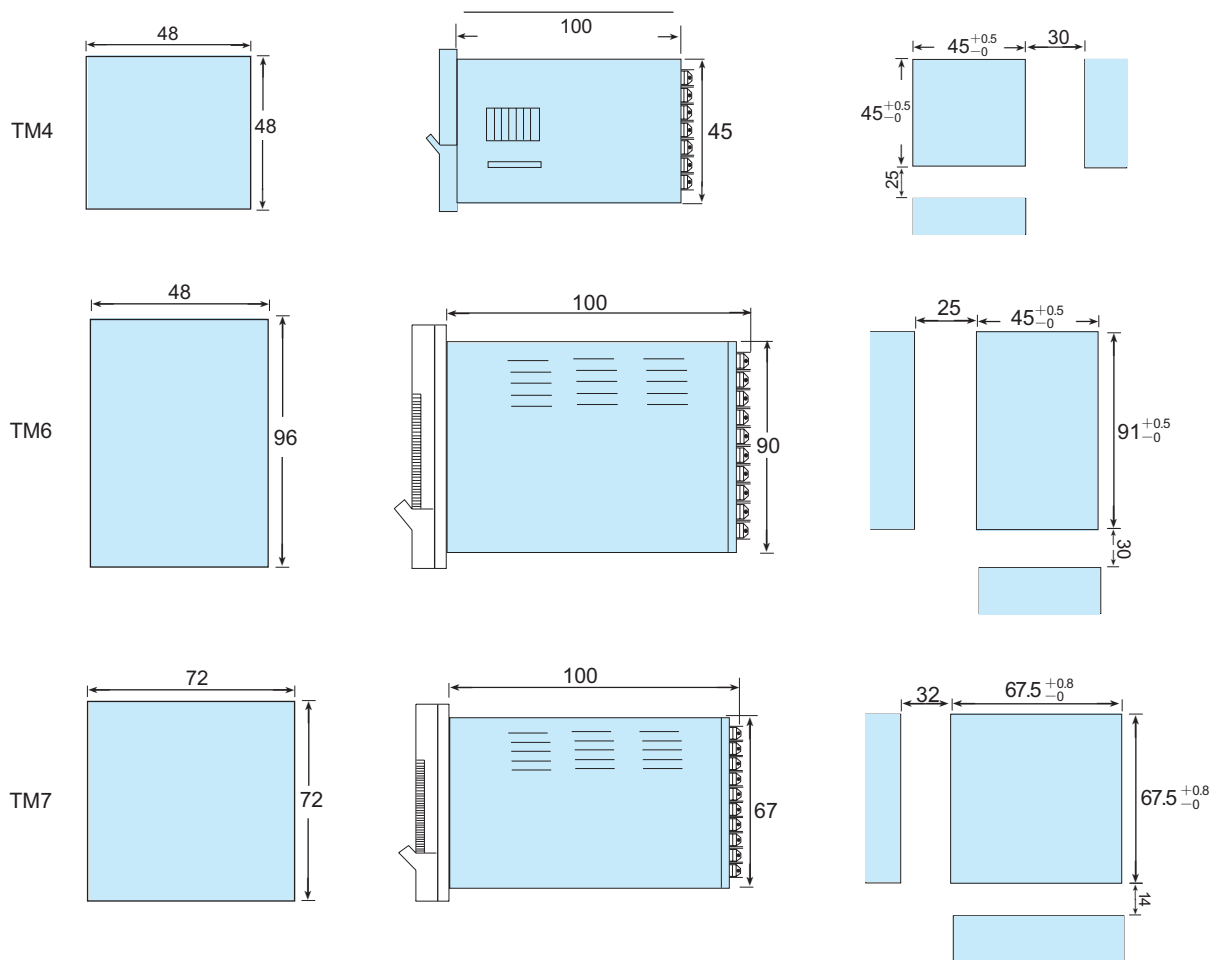
PANEL ILLUSTRATION



CONNECTION DIAGRAM



DIMENSIONS AND CUT-OUT



TD Series Temperature Controller Manual



Features

- ⊙ TC / RTD universal input, selected by software menu.
- ⊙ Displaying and controlling function, 4 digit LED display.
- ⊙ Advanced Two Degrees of Freedom PID Arithmetic.
- ⊙ Auto-tuning PID function for heating controlled system.
- ⊙ Optional Relay / SSR control output.
- ⊙ One alarm output, optional alarm mode.

For your safe, please read the below content carefully before you use the temperature controller!

■ Safe Caution

※ Please read the manual carefully before you use the temperature controller.

※ Please comply with the below important points.

⚠ **Warning** An accident may happen if the operation does not comply with the instruction.

⚠ **Notice** An operation that does not comply with the instruction may lead to product damage.

※ The instruction of the symbol in the manual is as below.

⚠ An accident danger may happen in a special condition.

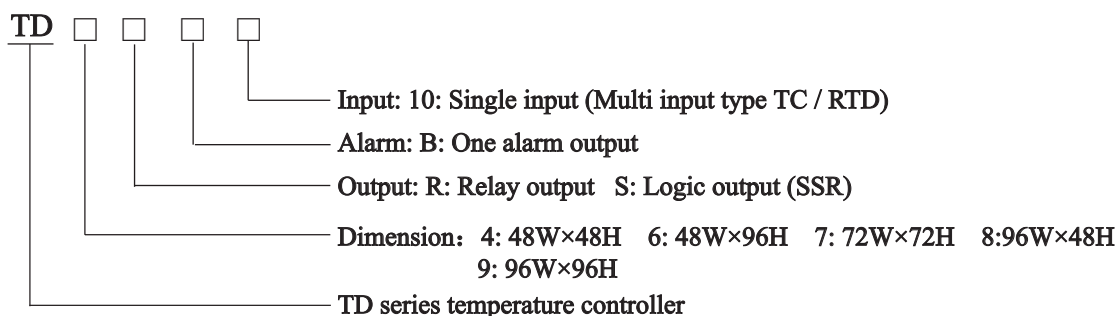
⚠ Warning

1. A safety protection equipment must be installed or please contact with us for the relative information if the product is used under the circumstance such as nuclear control, medical treatment equipment, automobile, train, airplane, aviation and equipment etc.. Otherwise, it may cause serious loss, fire or person injury.
2. A panel must be installed, otherwise it may cause creepage (leakage).
3. Do not touch wire connectors when the power is on, otherwise you may get an electric shock.
4. Do not dismantle or modify the product. If you have to do so, please contact with us first. Otherwise it may cause electric shock and fire.
5. Please check the connection number while you connect the power supply wire or input signal, otherwise it may cause fire.

⚠ Caution

1. This product cannot be used outdoors. Otherwise the working life of the product will become shorter, or an electric shock accident may happen.
2. When you connect wire to the power input connectors or signal input connectors, the moment of the No.20 AWG (0.50 mm²) screw tweaked to the connector is 0.74N.m - 0.9N.m. Otherwise the connectors may be damaged or get fire.
3. Please comply with the rated specification. Otherwise it may cause electric shock or fire, and damage the product.
4. Do not use water or oil base cleaner to clean the product. Otherwise it may cause electric shock or fire and damage the product.
5. This product should be avoid working under the circumstance that is flammable, explosive, moist, under sunshine, heat radiation and vibration. Otherwise it may cause explosion.
6. In this unit it must not have dust or deposit, otherwise it may cause fire or mechanical malfunction.
7. Do not use gasoline, chemical solvent to clean the cover of the product because such solvent can damage it. Please use some soft cloth with water or alcohol to clean the plastic cover.

1. Model



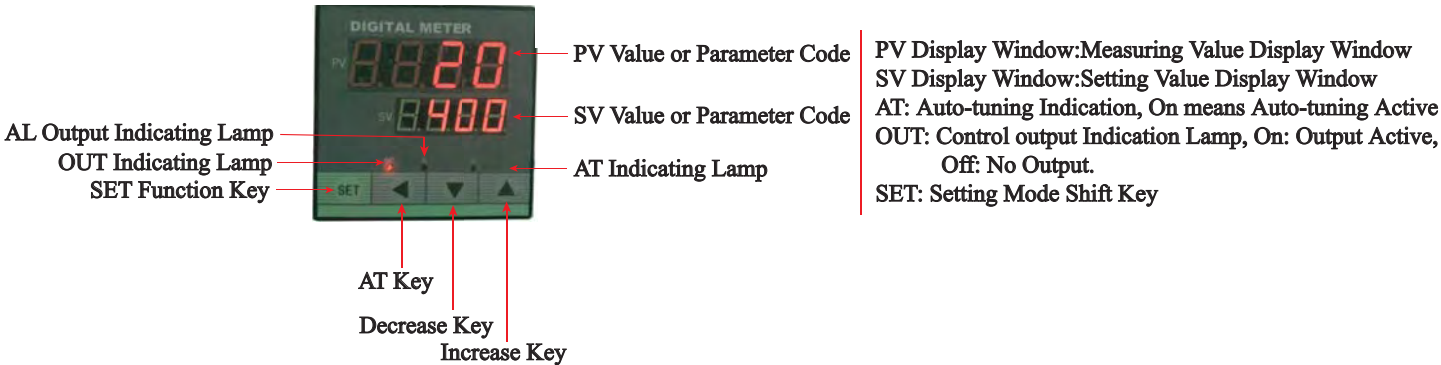
2. Model indication

Model	Control Output Mode	Alarm Output
TD□-RB10	Relay output	One relay output
TD□-SB10	Logic output	One relay output

3. Main Technical Parameters

Input Signal	For TC: Resolution 1℃ Accuracy 0.5%FS±3digits (below 600℃) 1%FS±3digits (above 600℃) For RTD: Resolution 0.1℃
Output Type	Relay output: Capacity 3A/220VAC Logic output: 5V Voltage, Load 30mA
Power Supply	220VAC±10%
Total Current	<30mA (220VAC)
Working Condition	0-50℃ 45-85%RH

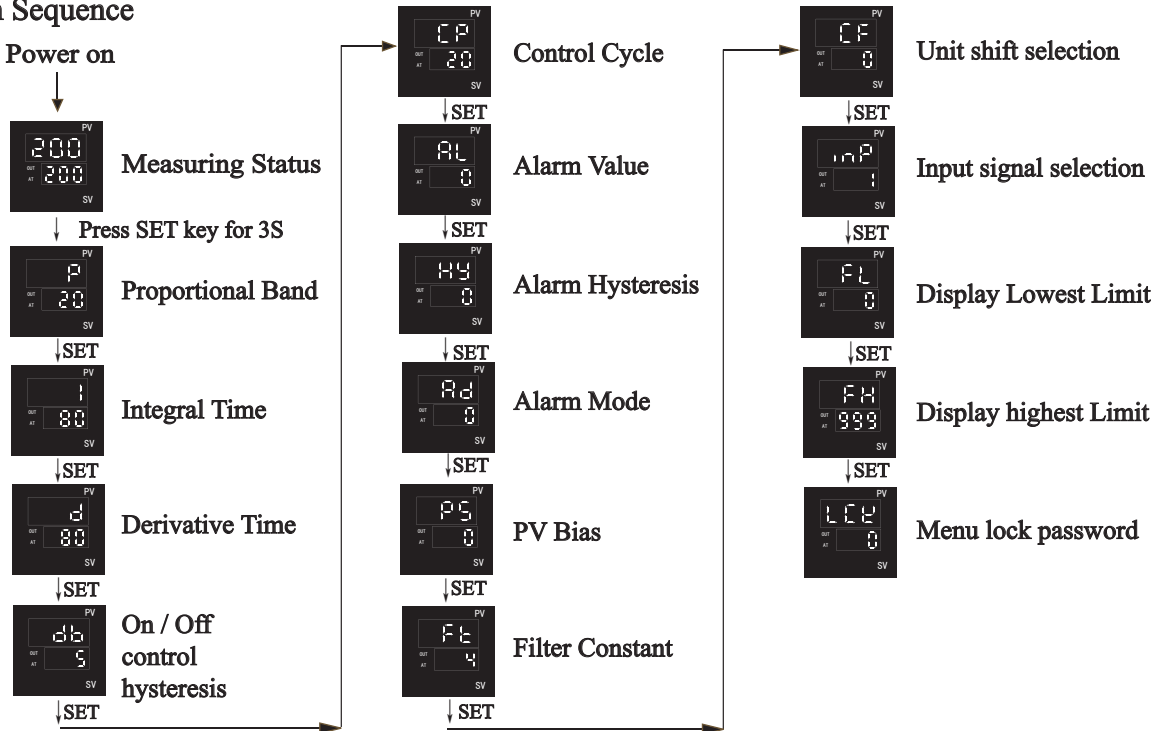
4. Panel Indication



5. Panel Key Operation

- (1) **SET Key:** In normal display status, press AT Key to show SV modifying menu, SV value flashes; press SET key for a few seconds to show setting menu.
- (2) **“▲”, “▼” Key:** Press ▲ or ▼ to set the value in SV value menu or setting menu.
- (3) **“▲” Key:** In modifying SV status, press it for a few seconds to increase SV value quickly.
- (4) **“▼” Key:** In modifying SV status, press it for a few seconds to decrease SV value quickly.
- (5) After parameters are changed, press SET key to confirm and save.
- (6) **“AT” Key:** In normal display status, press it for above 3 seconds to start Auto-tuning function.

6. Operation Sequence



7. Setting Menu

Parameter	Indication	Setting Range	Ex-Factory setting
P	Proportional Band. The smaller the proportional band is, the faster the system heats. Instead, the slower the system heats. Increase proportional band will decrease the oscillation, but increase control bias. Decrease proportional band will decrease control bias, but cause oscillation. (If P=0, it is On/Off control.)	0-Highest Limit	60
I	Integral Time. The smaller the integral time is, the stronger the integral action is and better for eliminating the bias between it and the setting value. If the integral time is too short, it may not eliminate the bias.	0-999	200
D	Derivative Time. To decrease the derivative time to a proper value can prevent the system from oscillating. The bigger the D is, the stronger derivative action is.	0-999	200
db	On / Off control hysteresis. (It is only effective for On / Off control.)	1-15	5
CP	Control cycle, 1 is SSR control output, 4-255 is relay control output.	1-255	20
RL	Alarm Value	0-999	200
HY	Alarm Hysteresis	0-50	1
Rd	Alarm Mode: HL: Absolute low, HH: Absolute high, DL: Relative low, DH: Relative high	HL, HH, DL, DH	HH
PS	PV bias applied to amend the bias caused by the measuring process.	-50-50	0
Ft	Filter constant. The smaller Ft is, the faster response is, but it may cause fluctuation.	1-60	20
CF	Display value unit selection: 0: °C 1: °F	0-1	0
INP	Input signal selection: 0: K type 1: J type 2: E type 3: T type 4: PT100 5: CU50 6: CU100	0-6	0
FL	Display lowest limit.	See input signal table	0
FH	Display highest limit.	See input signal table	1200
LCF	Menu lock password. SV value is prohibited to change if rightmost digit is 1. All other value is prohibited to change if tens digit is 1.	0-9999	0

Input signal table

No.	Input signal	Measuring range	Resolution	Accuracy	Input impedance
0	K type TC	-20~1300℃	1℃	0.5%FS±3digits	>100KΩ
1	J type TC	-20~1200℃	1℃	0.5%FS±3digits	>100KΩ
2	E type TC	-20~1000℃	1℃	0.5%FS±3digits	>100KΩ
3	T type TC	-20~400℃	1℃	0.5%FS±3digits	>100KΩ
4	PT100	-199~600℃	0.1℃	0.5%FS±3digits	(0.2mA)
5	CU50	-50~150℃	0.1℃	0.5%FS±3digits	(0.2mA)
6	CU100	-50~150℃	0.1℃	0.5%FS±3digits	(0.2mA)

8. Advanced Function

P.I.D parameters setting & Auto-tuning operation

1. To set P.I.D. parameters manually;

The default PID value has been pre-set when the product is ex-factory. This P.I.D value is applicable to normal heating system for temperature control. If the temperature control performance is not very good with the default PID value, the value can be changed according to the experience for those users who have the automation control theory & experience.

2. To set P. I. D parameters automatically:

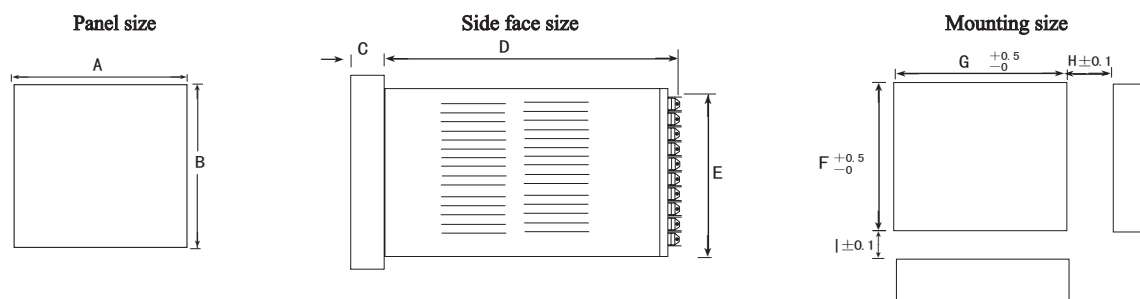
If users do not know how to set the PID value, they can use the Auto-tuning function of the product. The Auto-tuning function will calculate the P. I. D. value it needs automatically as per different heating system to control temperature.

Auto-tuning method: At first set the SV value, then press “AT” for more than 3S. Wait until the “AT” indicating lamp turning on, then release pressing. AT indicating lamp ON means Auto-tuning is running.

Please do not change SV value or other parameters on the controller or the controlled equipments to make sure the Auto-tuning gets an accurate result. After the AT lamp turns off, the controller will refresh the P.I.D value automatically.

At this time, the controller can control temperature automatically and precisely.

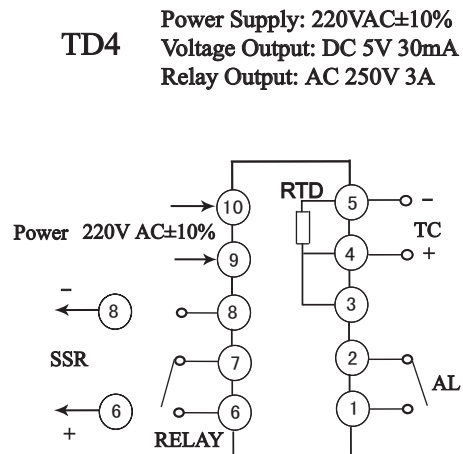
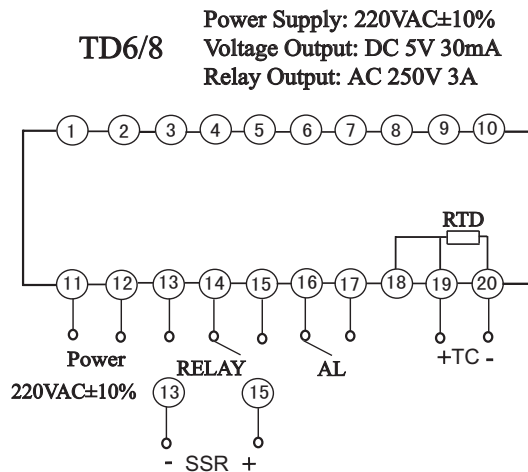
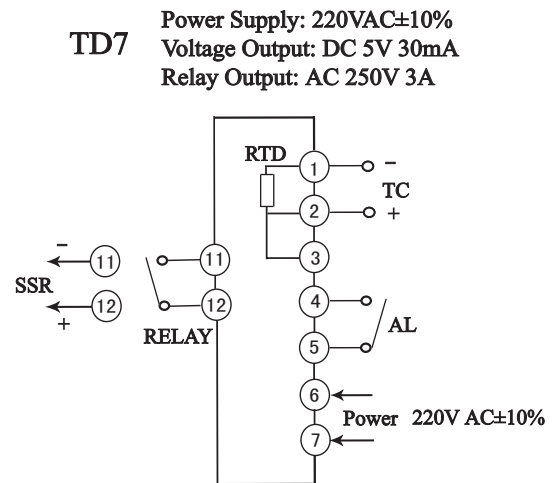
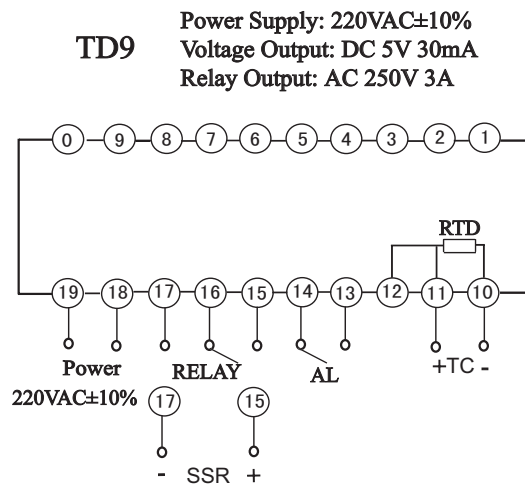
9. Outlook and installation dimension



Model	A	B	C	D	E	F	G	H	I
TD4	48	48	6	100	45	46	46	30	30
TD6	48	96	10	100	89.5	91	46	30	30
TD7	72	72	10	100	67	68	68	30	30
TD8	96	48	10	100	45	46	91	30	30
TD9	96	96	10	100	89.5	91	91	30	30

Unit: mm

10. Connection drawing



Note: Please subject to the drawing on the product as final if it is different from the above one.

11. Simple Problem Shooting

Display Message	Shooting Method
Display Err	To check input signal connection well or not. To check FH, FL value; To check working temperature is OK or not. To check input signal selection is right or not.

TA Series Temperature Controller Manual



Features

- ⊙ K type TC input, other type input should be ordered.
- ⊙ Displaying and controlling function.
- ⊙ Advanced Two Degrees of Freedom PID Arithmetic.
- ⊙ Auto-tuning PID function for heating controlled system.
- ⊙ Relay/SSR output.
- ⊙ Applied to temperature control system requiring cost-effective.

For your safe, please read the below content carefully before you use the temperature controller!

■ Safe Caution

- | | |
|---|---|
| ※ | Please read the manual carefully before you use the temperature controller. |
| ※ | Please comply with the below important points. |
| ⚠ | Warning An accident may happen if the operation does not comply with the instruction. |
| ⚠ | Notice An operation that does not comply with the instruction may lead to product damage. |
| ※ | The instruction of the symbol in the manual is as below. |
| ⚠ | An accident danger may happen in a special condition. |

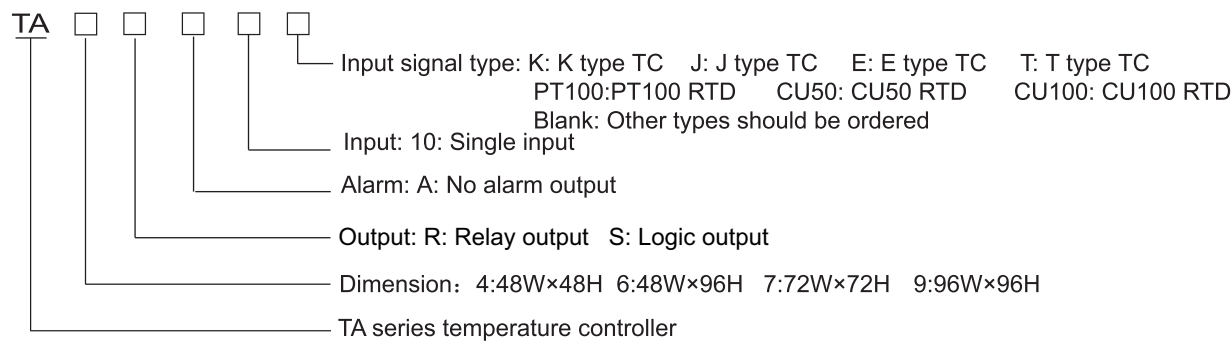
⚠ Warning

1. A safety protection equipment must be installed or please contact with us for the relative information if the product is used under the circumstance such as nuclear control, medical treatment equipment, automobile, train, airplane, aviation and equipment etc.. Otherwise, it may cause serious loss, fire or person injury.
2. A panel must be installed, otherwise it may cause creepage (leakage).
3. Do not touch wire connectors when the power is on, otherwise you may get an electric shock.
4. Do not dismantle or modify the product. If you have to do so, please contact with us first. Otherwise it may cause electric shock and fire.
5. Please check the connection number while you connect the power supply wire or input signal, otherwise it may cause fire.

⚠ Caution

1. This product cannot be used outdoors. Otherwise the working life of the product will become shorter, or an electric shock accident may happen.
2. When you connect wire to the power input connectors or signal input connectors, the moment of the No.20 AWG (0.50 mm²) screw tweaked to the connector is 0.74N.m - 0.9N.m. Otherwise the connectors may be damaged or get fire.
3. Please comply with the rated specification. Otherwise it may cause electric shock or fire, and damage the product.
4. Do not use water or oil base cleaner to clean the product. Otherwise it may cause electric shock or fire and damage the product.
5. This product should be avoid working under the circumstance that is flammable, explosive, moist, under sunshine, heat radiation and vibration. Otherwise it may cause explosion.
6. In this unit it must not have dust or deposit, otherwise it may cause fire or mechanical malfunction.
7. Do not use gasoline, chemical solvent to clean the cover of the product because such solvent can damage it. Please use some soft cloth with water or alcohol to clean the plastic cover.

1. Model



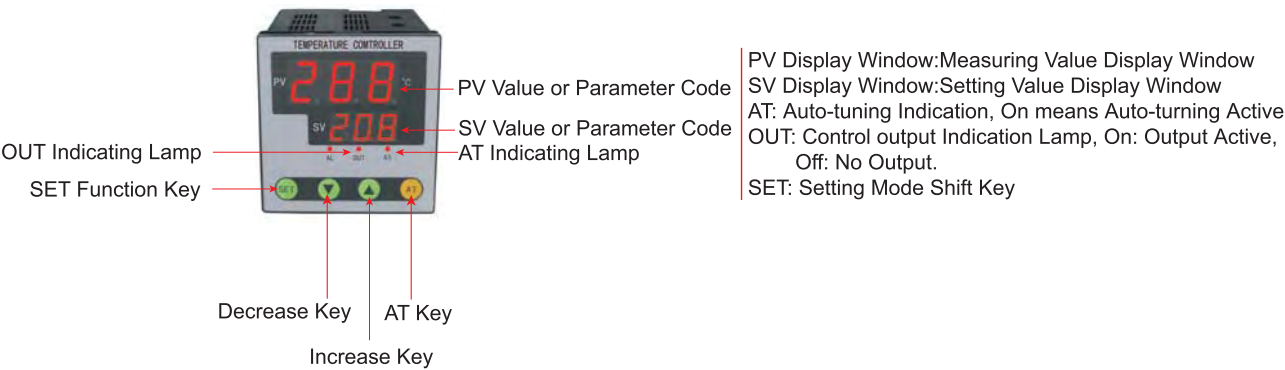
2. Model indication

Model	Output Mode	Dimension(mm)
TA4-RA10 ☐	Relay output	48Hx48WX100L
TA4-SA10 ☐	Logic output	48Hx48WX100L
TA6-RA10 ☐	Relay output	96Hx48WX100L
TA6-SA10 ☐	Logic output	96Hx48WX100L
TA7-RA10 ☐	Relay output	72Hx72WX100L
TA7-SA10 ☐	Logic output	72Hx72WX100L
TA9-RA10 ☐	Relay output	96Hx96WX100L
TA9-SA10 ☐	Logic output	96Hx96WX100L

3. Technical Parameters

Input Type	TC type K, Resolution 1℃, Accuracy 0.5%FS±3digits
Output Type	Relay output: Capacity 3A/220VAC
	Logic output: 5V Voltage, Load 30mA
Voltage	220VAC±10%
Current	<30mA (220VAC)
Ambient Temperature	0-50℃
Ambient Humidity	45-85RH%

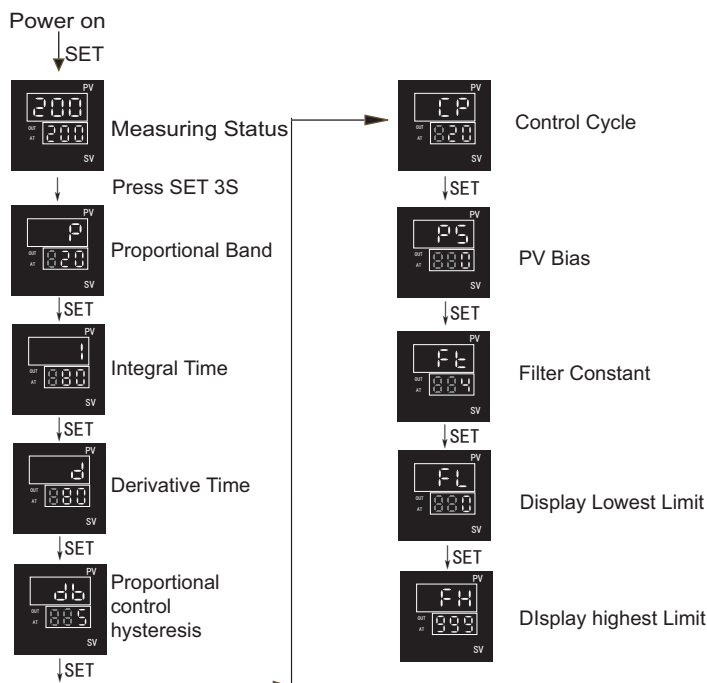
4. Panel



5. Panel Key Operation

- (1) SET Key: In normal display status, press AT Key to show SV modifying menu, SV value flashes; press SET key for a few seconds to show setting menu.
- (2) “▲”, “▼” Key: Press them to set the value in SV value menu or setting menu.
- (3) “▲” Key: In modifying SV status, press it for a few seconds to increase SV value quickly.
- (4) “▼” Key: In modifying SV status, press it for a few seconds to decrease SV value quickly.
- (5) After parameters are changed, press SET key to confirm and save.
- (6) “AT” Key: In normal display status, press it for a few seconds to start Auto-tuning function.

6. Operation Sequence



7. PID Control Menu

Parameter	Indication	Setting Range	Ex-Factory setting
P	Proportional Band. The smaller the proportional band is, the faster the system heats. Instead, the slower the system heats. Increase proportional band will decrease the oscillation, but increase control bias. Decrease proportional band will decrease control bias, but cause oscillation.	0-Highest Limit	20
I	Integral Time. The smaller the integral time is, the stronger the integral action is and better for eliminating the bias between it and the setting value. If the integral time is too short, it may not eliminate the bias.	0-999S	240
d	Derivative Time. To decrease the derivative time to a proper value can prevent the system from oscillating. The bigger the D is, the derivative action is.	0-999S	240
db	Proportional control hysteresis (only for On / Off control).	1-15	5
CP	Control cycle, 1 is SSR control output, 4-255 is relay control output.	1-255	20
PS	PV bias applied to amend the bias caused by the measuring process.	-50-50	0
Ft	Filter constant. The smaller Ft is, the faster response is, but it may cause fluctuation.	1-60	4
FL	Display lowest limit.	0-999	0
FH	Display highest limit.	0-999	999

8. Advanced Function

P.I.D parameters setting & Auto-tuning operation

- To set P.I.D. parameters manually:
The default PID value has been pre-set when the product is ex-factory. This P.I.D value is applicable to normal heating system for temperature control. If the temperature control performance is not very good with the default PID value, the value can be changed according to the experience for those users who have the automation control theory & experience.

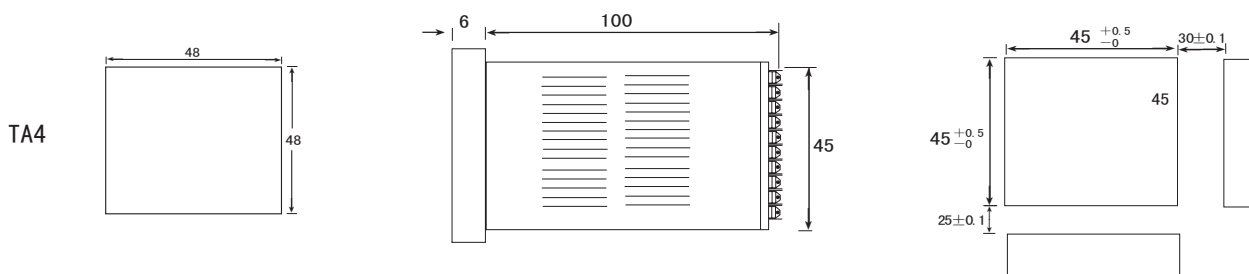
- To set P. I. D parameters automatically:
If users do not know how to set the PID value, they can use the Auto-tuning function of the product. The Auto-tuning function will calculate the P. I. D. value it needs automatically as per different heating system to control temperature.

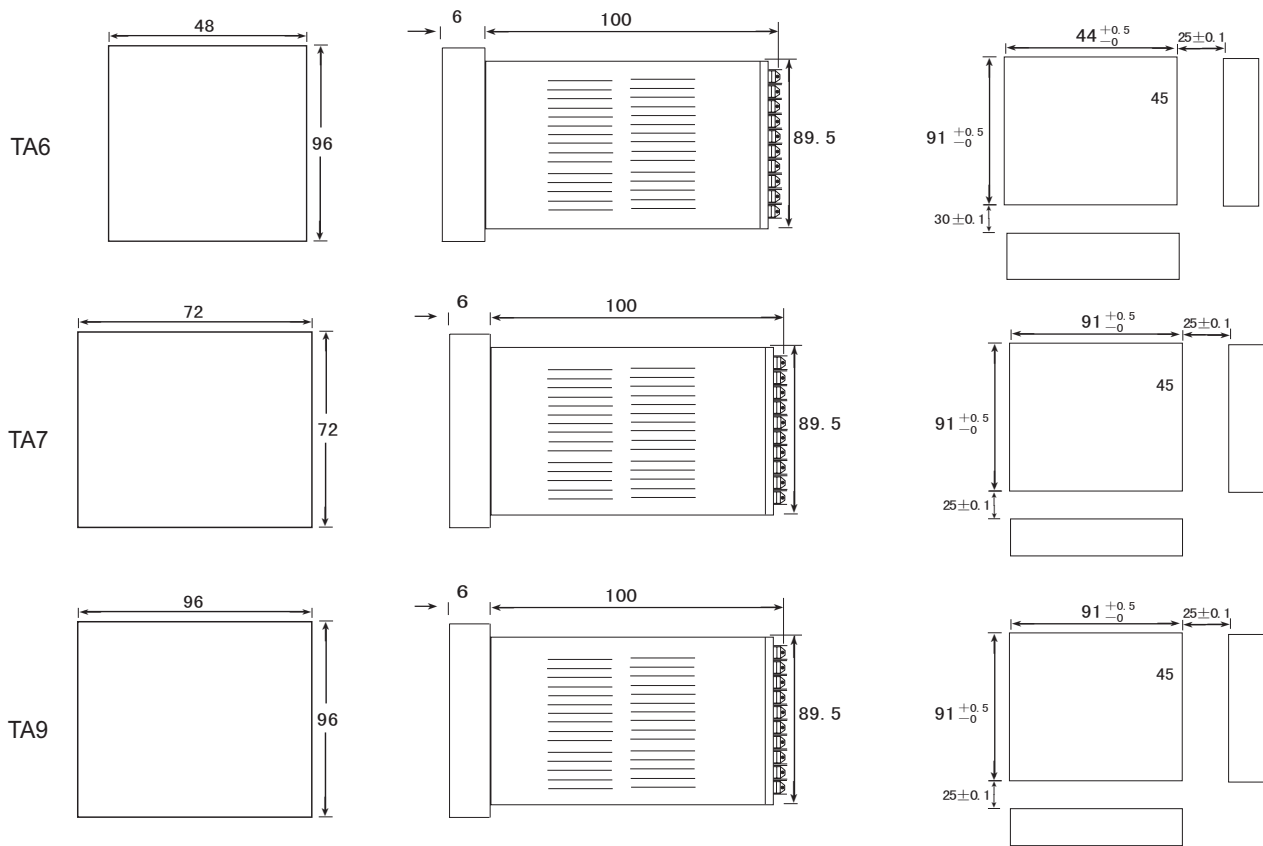
Auto-tuning method: At first set the SV value, then press "AT" for more than 3S. Wait until the "AT" indicating lamp turning on, then release pressing. AT indicating lamp ON means Auto-tuning is running.

Please do not change SV value or other parameters on the controller or the controlled equipments to make sure the Auto-tuning gets an accurate result. After the AT lamp turns off, the controller will refresh the P.I.D value automatically.

At this time, the controller can control temperature automatically and precisely.

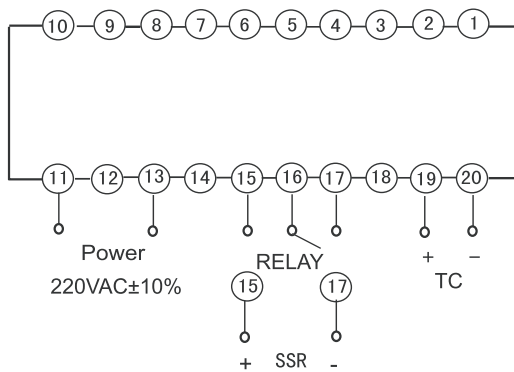
9. Outlook and installation dimension



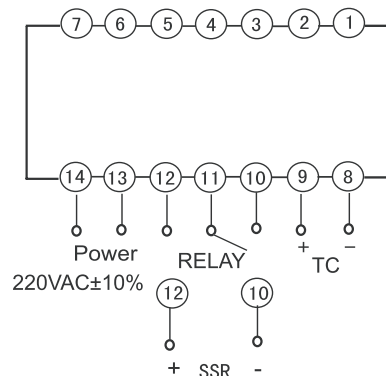


10. Connecting drawing

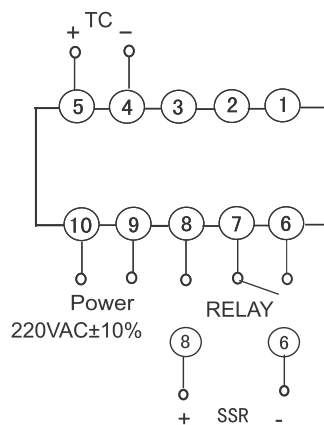
TA6/9 Power Supply:220VAC±10%
Voltage Output:DC 5V 30mA
Relay Output:AC 250V 3A



TA7 Power Supply:220VAC±10%
Voltage Output:DC 5V 30mA
Relay Output:AC 250V 3A



TA4 Power Supply:220VAC±10%
Voltage Output:DC 5V 30mA
Relay Output:AC 250V 3A



Note: please subject to the diagram on the product if any changes.

11. Simple Problem Shooting

Display Message	Shooting Method
Display ERR	To check input signal connects or not. To check FH, FL value. To check working temperature is normal or not. To check input signal selection is right or not.

TX3 COMPRESSOR THERMOSTAT

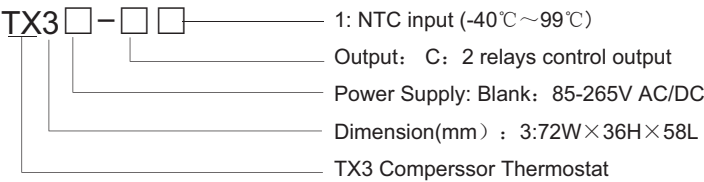


FEATURES

- ⊙ Temperature display/control
- ⊙ Measuring range:-40℃~99℃
- ⊙ Delayed Alarm (special order)
- ⊙ Time defrosting
- ⊙ Sensor break protection /error display

Application: TX3 comperssor thermostat is special designed for refrigerating apparatus and machines. TX3 is with the function of constant temperature controlling ,defrosting and protecting frigerating compressor by press key simple setting.

CODE ILLUSTRATION



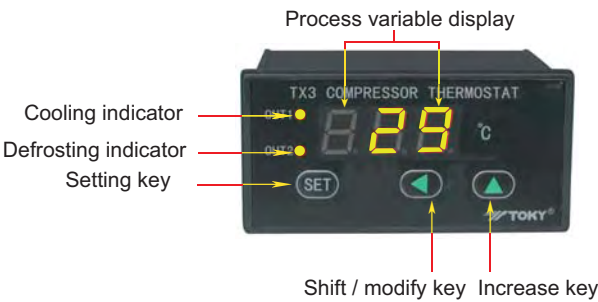
ORDERING CODE

Code	Control Output	Input Type	Dimension(mm)
TX3-C1	2 relay output	NTC-10K	36H×72W×58L

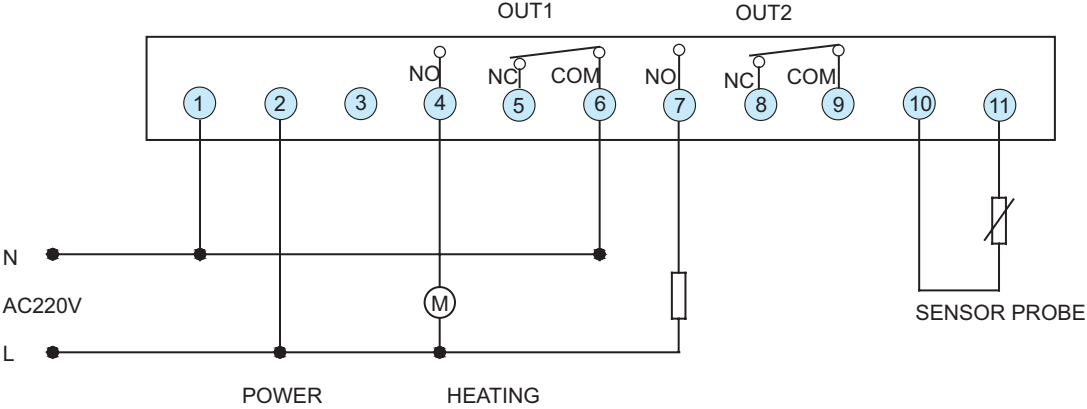
TECHNICAL SPECIFICATION

Power Supply	AC:85~265V (50HZ~60HZ)
Power Consumption	<1.5VA
Ambient Temperature	0℃~50℃
Ambient Humidity	<80%RH
Measuring Accuracy	±1℃
Temperature Drift	±3dight
Input type	Single NTC-10K
Resolution	1℃
Sampling Time	0.5S
Output Mode	Relay Output
Relay Capacity	AC 250V/3A或DC 30V/3A

PANEL ILLUSTRATION



CONNECTION DIAGRAM



DIMENSIONS AND CUT-OUT

